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WATER SUPPLY & SANITARY IMPROVEMENT

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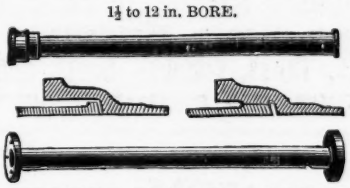

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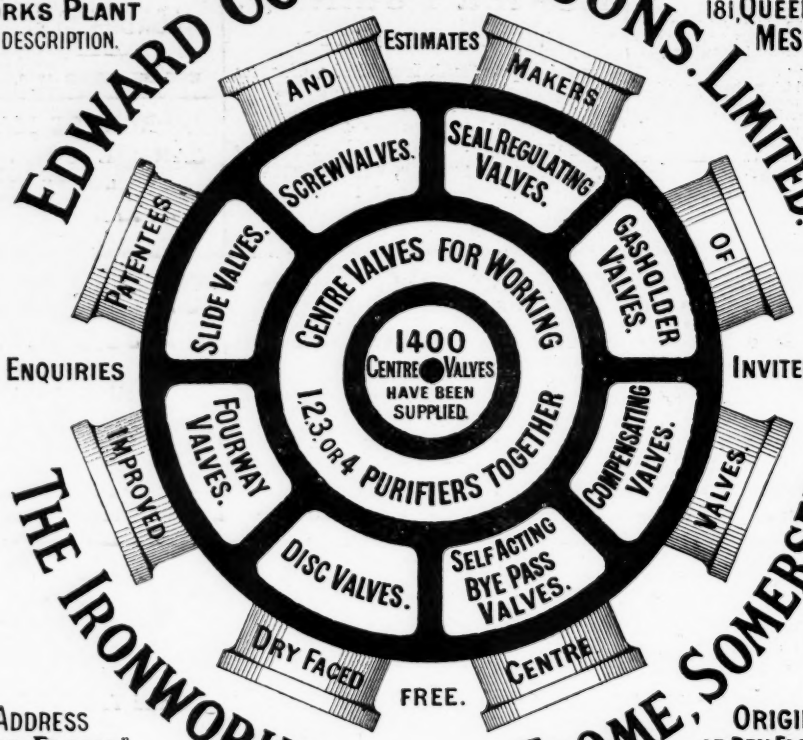

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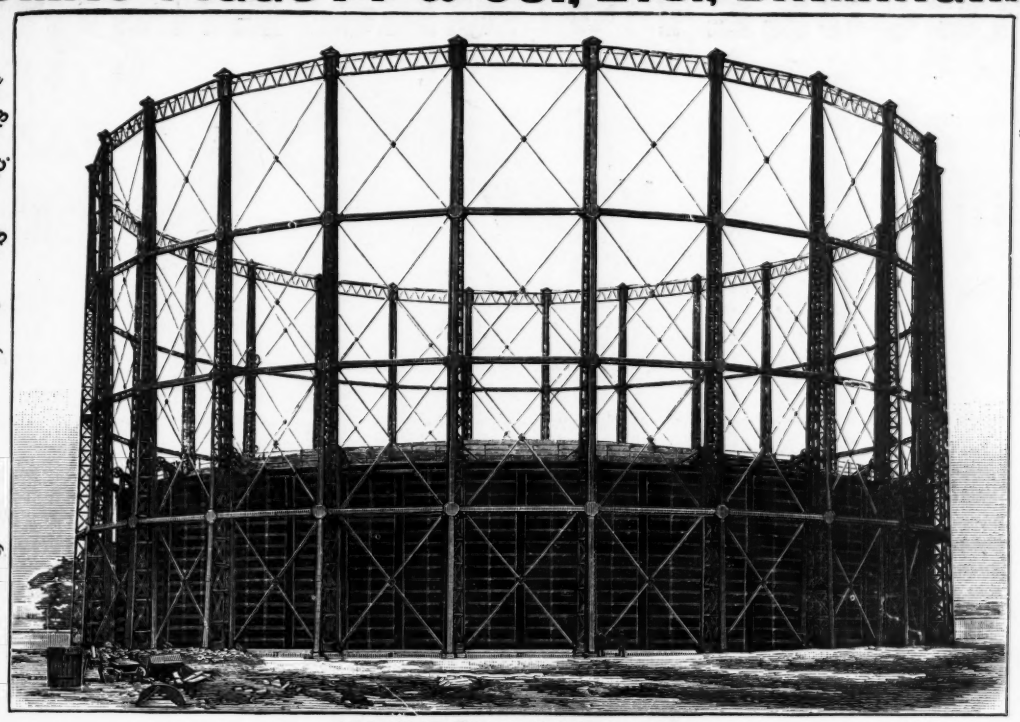

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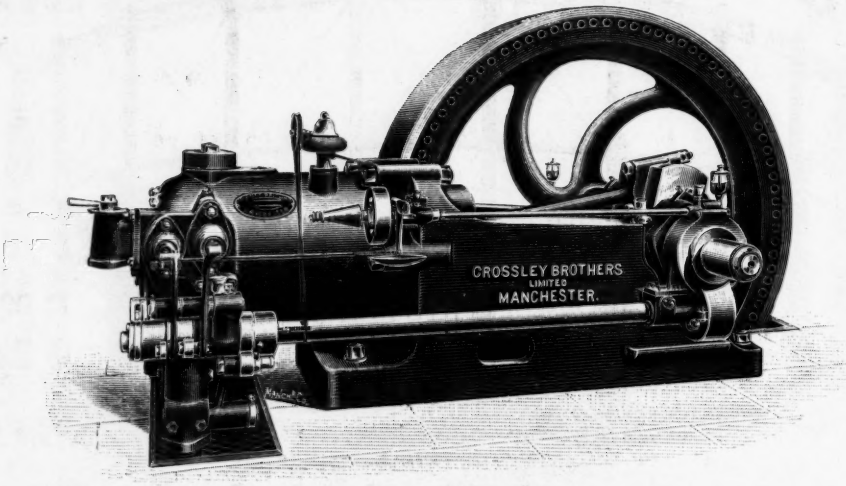

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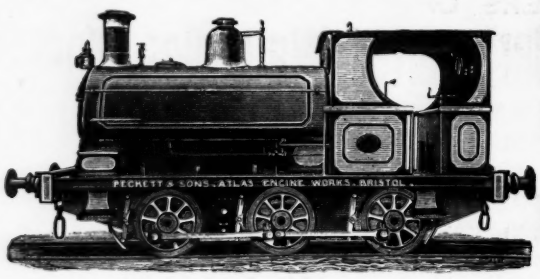

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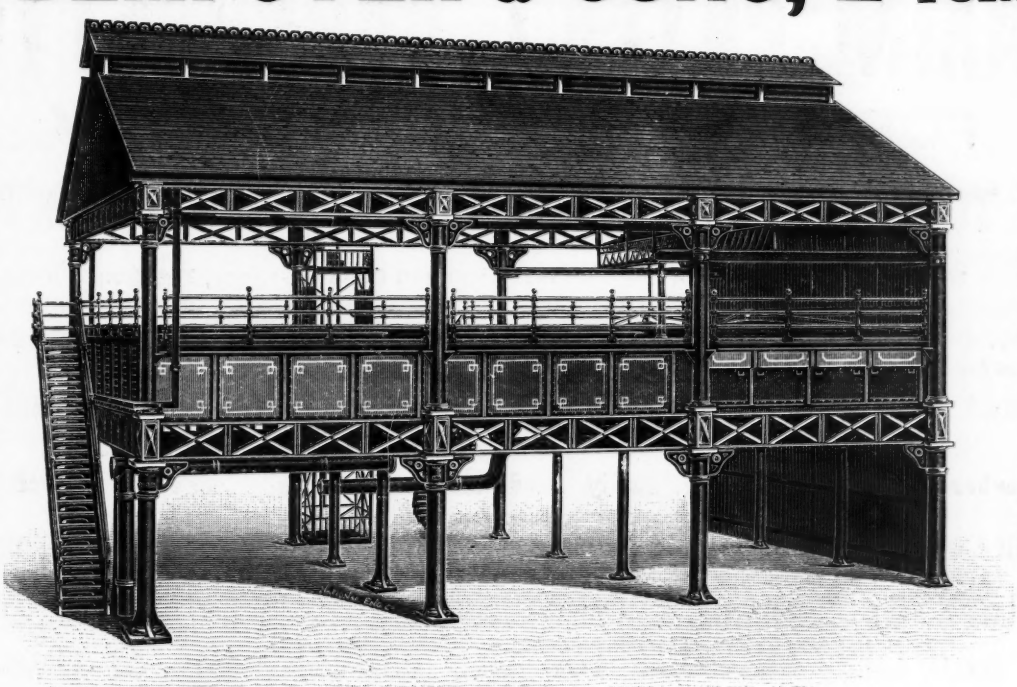

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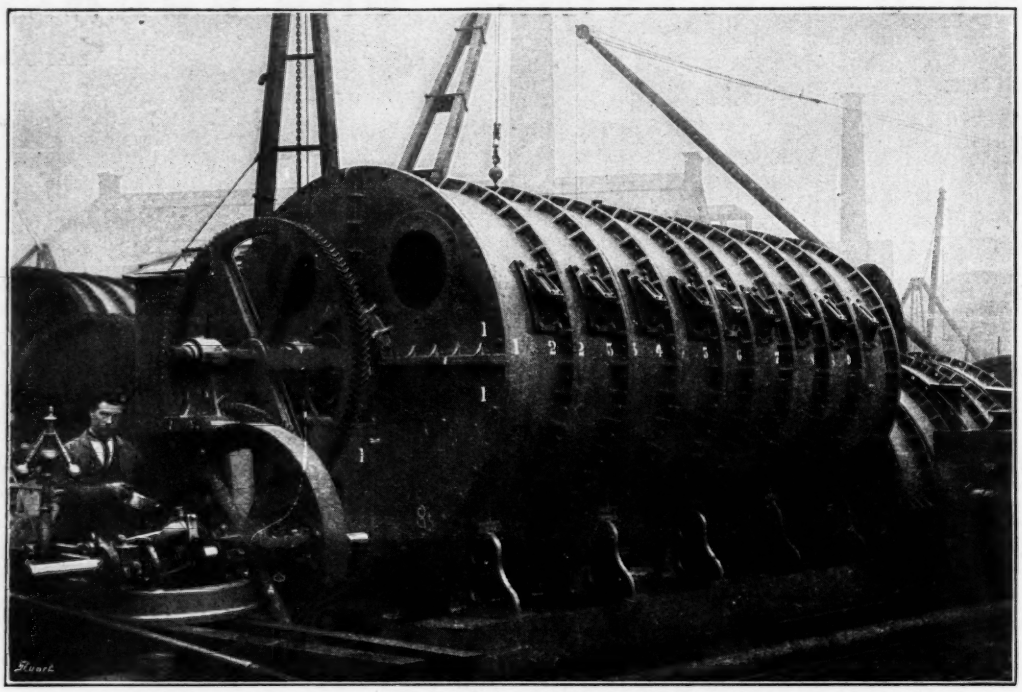

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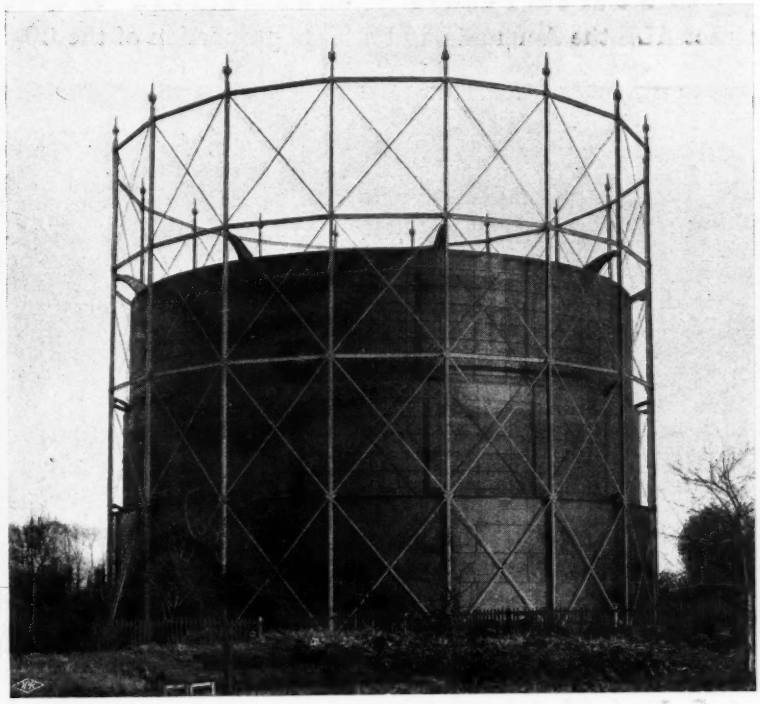

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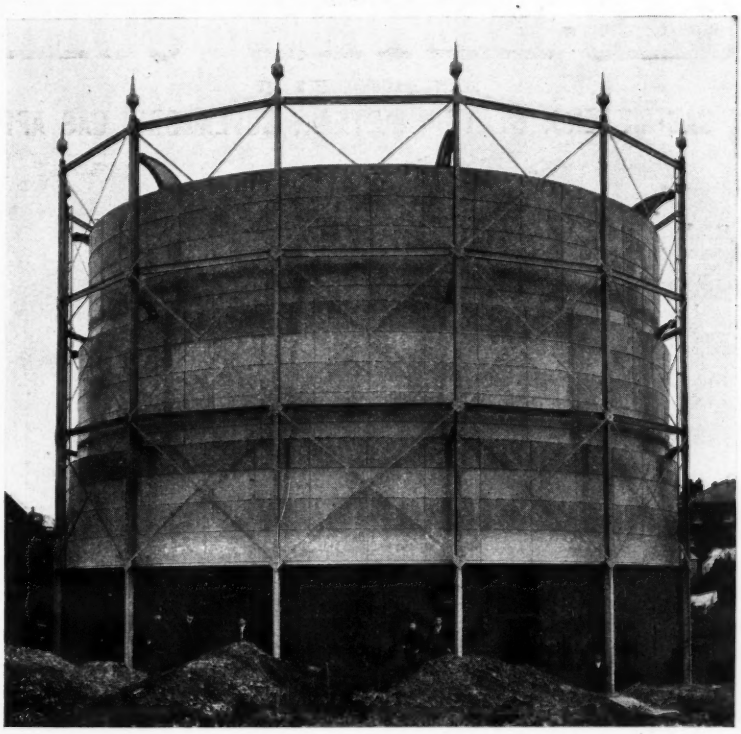

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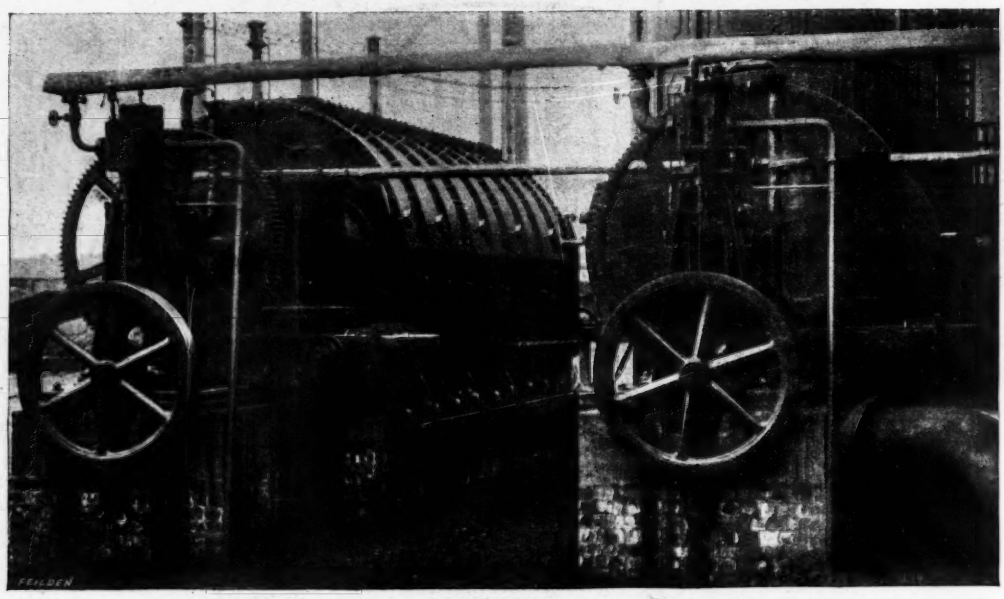

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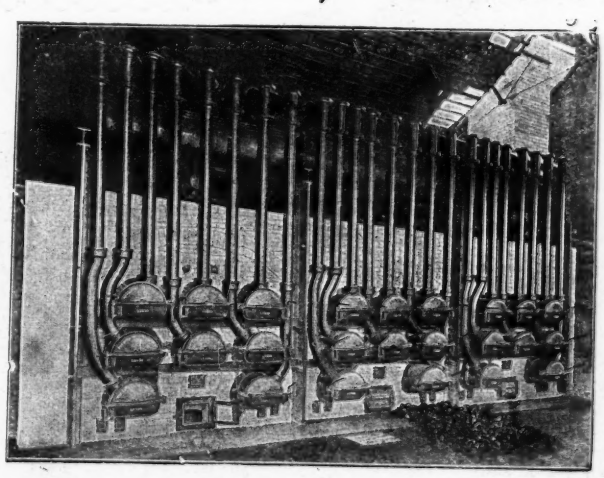

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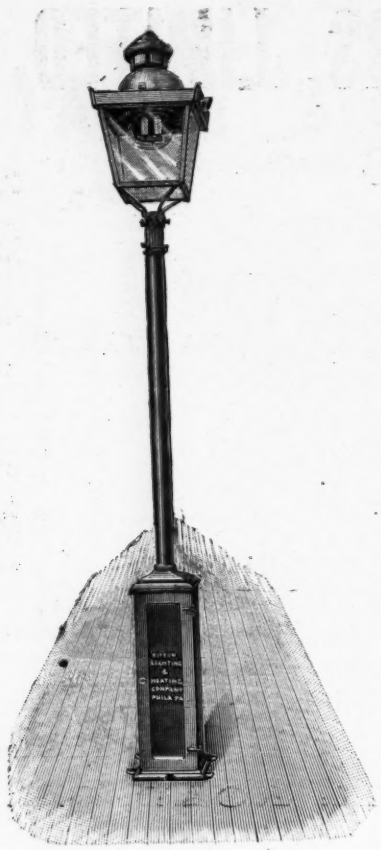

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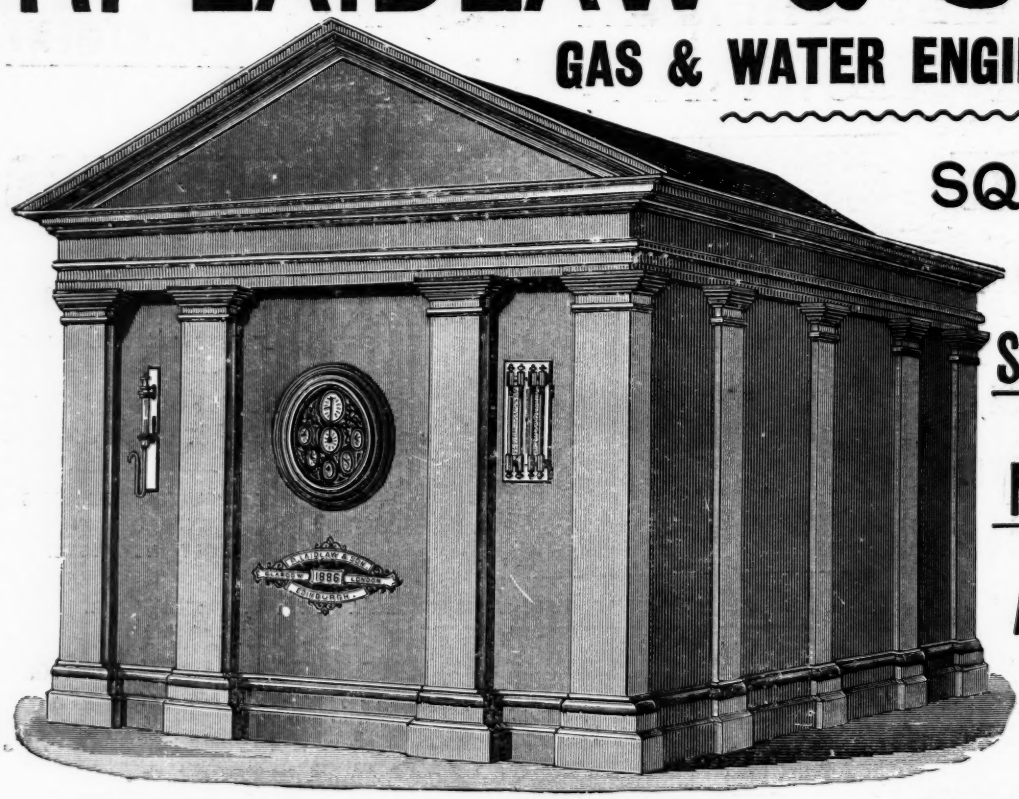

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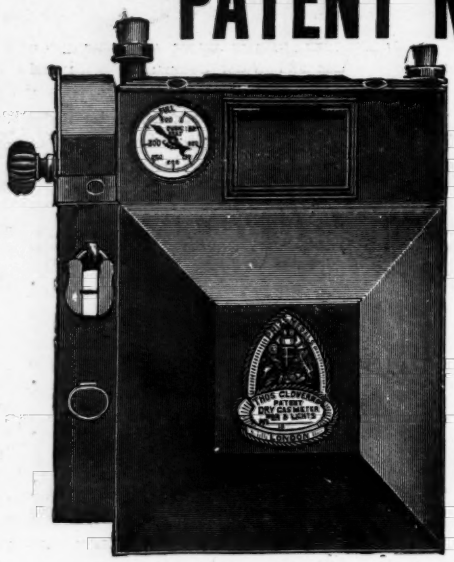

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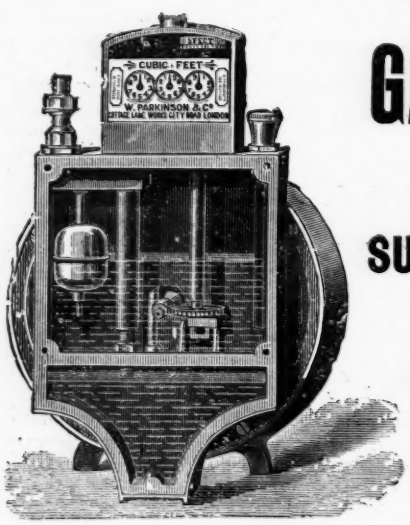

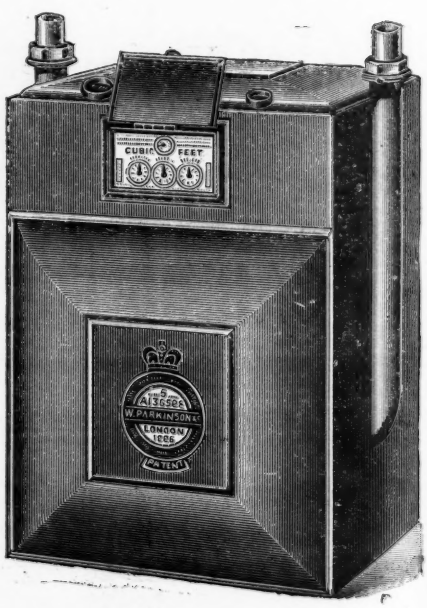

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JOURNAL OF GAS LIGHTING, WATER SUPPLY, &c.

VOL. LXXVII., No. 1975.——TUESDAY, MARCH 19, 1901.

EDITORIAL NOTES.

The Output and Price of Coal.

THE publication last week by the Home Office of the preliminary figures relating to the output of coal during the year 1900, and the announcement by the Lancashire and Yorkshire coalowners of what they consider an adequate reduction in the price of coal for impending contracts, lead us again to discuss the probabilities of the coal situation in the coming months—a subject which almost every gas manager in these islands is at the present moment earnestly considering. The output of coal from our mines last year reached the record figure of 225,170,163 tons, or 5,084,795 tons more than in 1899. The total increase of the past five years (the period during which the great trade revival has taken place) has been 35½ million tons, or an average increase of 7·1 million tons per annum—a rate of expansion which would, if maintained, be of serious import. But there is little likelihood of such an increment being witnessed in the next ten years as has been seen in the past five.

As to the larger output of last year, we may say that the total quantity raised has not proved as great as we anticipated. The reason lies solely in the less productive working of the miners. The quantity raised per worker employed underground fell off about 5 per cent., which is equivalent to each man being idle for (say) 15 working days more last year than in 1899. It is, however, only fair to point out that some small part of the reduction in the *per capita* output was due to the employment of less experienced miners—some to replace those called out for service abroad, others to actually augment the total number employed. But, after making ample allowance for these circumstances, the fact remains that, while in 1899 the men did not slacken, but rather improved in, their rate of working, last year there was a widespread tendency to "go easy," and also, in some districts at any rate (especially Wales), a deliberate restriction of output. The extent to which this affected the production can best be shown by saying that had the output per miner been the same in 1900 as in 1899, the increase would have been 16 million tons, instead of only 5 millions; or, put in another way, had there been no increase in the number of men employed last year, and the production per miner had only reached the average shown for the year 1900, there would have been a decrease of about 11 million tons in the output. Of the increase of 5,084,795 tons that did take place, just about half—to be exact, 2,522,122 tons—was accounted for by the expansion of the shipments of coal out of this country. So that an addition of 2½ million tons to the quantity put on the home market was sufficient, coupled with the slackening of trade in the second half of the year, to completely alter the condition of the coal trade. Not, however, before the mischief was actually done, past present repair; for the blighting influence of high prices has been at work for a sufficiently long period to mar the industrial prosperity of this country for some time to come.

The Board of Trade statistics on the state of the skilled labour market in February show no signs of trade recovering from that influence, in spite of the fall in prices. In all the trades directly affected by the cost of coal, the same condition of things subsists. In the pig-iron industry, employment shows a further decline, and is much worse than a year ago. There were 19 more furnaces blown out last month; and the total number now in blast is only 288, as compared with 383 in February, 1900. The iron and steel making trades report a considerable decrease; in the tinplate trade, employment shows a further falling off, and compares very badly with last year; the shipbuilding and engineering industries are slacker; while employment in all branches of the building trades continues to decline.

To take our own special industry alone—who in the gas world, having eyes to see and ears to hear withal, is unconscious of the detriment caused to business by the higher price of gas? We have heard that some people blame it all on to the weather, yet cannot but think they have been slandered; for the truth is so self-evident as to need no demonstration to any but the most obtuse. Fortunately for the industry, the higher prices will not have been current for a sufficiently long time to do serious permanent injury to the sales of gas. People will not, where they have had the cause of the rise in price and its temporary character carefully explained to them, have deserted gas for other illuminants or heat-producers; and they will soon resume their less restricted use of it after prices have come back to former levels. The question is, When will that be? And this brings us to a consideration of the reported decisions of the owners in Lancashire and Yorkshire as to the concessions they will offer for the impending contracts for the next twelve months. The contract price of gas coal was put up last year by the collieries in these two counties, working in harmony, at least 5s., and in many cases more than 5s., per ton. The coalition of the Lancashire and Yorkshire collieries is at the present time by no means so stable as it was twelve months ago, owing to the increasing difficulty that some of them find in disposing of their output. But the proclaimed policy of the owners in both counties is practically the same. The Lancashire collieries at a recent meeting decided to put in tenders for the next gas coal contracts at 2s. 6d. under last year's prices. Their Yorkshire brethren a week ago came to the conclusion that they would concede the same reduction—2s. 6d. for twelve-months contracts, but only 1s. 6d. per ton for shorter-period contracts.

So the colliery owner proposes. It does not by any means follow—it certainly ought not to follow—that the buyer will, on those lines, dispose. The proposal, not to put too fine a point upon it, is an impudent one. Durham gas coal contract prices rose last year about 7s. 6d. to 8s. per ton—averaging about 16s. to 17s. per ton f.o.b. The present quotation is 9s. 3d. to 10s., or a fall which leaves prices a bare 1s. above the 1899-1900 rates. And then Lancashire and Yorkshire generously offer to take off 2s. 6d. per ton! We do not think there can be much doubt about the answer they will get from the gas undertakings they wish to supply. The collieries may be able to persuade the householder and the poor man in the street to keep on yet a while longer paying prices unwarranted by the conditions existing—though at West Hartlepool they appear to have reckoned without Alderman Pyman and the Corporation; but they cannot expect the gas industry to be quite so obliging. So far as the supply in the market is concerned, there is absolutely no reason why prices should not fall back to the level from which they rose at the end of 1899. It is, of course, possible (and even probable) that the output this year may not exceed—may not indeed equal—that in 1900; for the disposition of the men to restrict production is on the increase, as witness the ten days per fortnight proposal of the Scotch miners. But then the demand is certain to be considerably less than last year. Consumption at home will be lower; exports are diminishing; while stocks were everywhere higher on Dec. 31 than they were on Jan. 1, 1900. So that even if the output fall back to the 1899 figure, there will be plenty of coal to go round. A strike is the only thing to fear; and the labour troubles in store for the coal trade are at present but in the making. He would be a bold man who would presume to foretell the date of their climax. Our advice to buyers of Yorkshire and Lancashire coal is to sit tight.

Withdrawal of the Gaslight and Coke Company's Bill.

THE dramatic element has hitherto been the last thing one would look for in "gas and water" politics. Weighty as might be the causes of legislative and administrative action in respect to such interests as are bound up in the statutory supply of gas and water, such proceedings have not usually possessed any "sensational" features. After what recently happened in connection with the proposed new regulations of the London Water Companies, and even more especially after the remarkable fate of the Gaslight and Coke Company's Bill last Thursday, this lack of dramatic interest in the history of gas and water supply can no longer be imputed. Readers of the "JOURNAL" know the circumstances in which the Gaslight and Coke Company found reasons for appealing to Parliament, for the third time, for additional capital powers. The details of the Bill promoted by the Company,

chiefly with a view to obtaining these facilities, have been explained and discussed on several occasions, all duly reported in the "JOURNAL." Professional opinion has been much exercised over the character and prospects of the measure, according as the view was taken that the Bill fairly met the declared opinion of Parliament in regard to the Company, or that it did so only in part. The hostility of the Metropolitan Local Authorities was expected, and in some sense discounted. We are free now to admit that we never heard from any independent gas engineer, experienced in the ways of Parliament, an expression of the faintest hope of the passing of the Bill as it stood. At the same time, the balance of critical opinion seemed to be that the Bill had points, and that something, at any rate, might be saved out of it by judicious generalship in Committee.

That the Bill might be attacked on the second reading, was more than probable. Although the General Election made a clean sweep of several of the representatives of Metropolitan constituencies notoriously hostile to the Company, enough remained to block the passage of the Bill through the House. The fact of the Company not possessing a very good name with the London Boroughs was conspicuously evidenced by their being constrained to procure the kind offices of Mr. C. A. Cripps, K.C., to say a few words for the Bill. The President of the Board of Trade, with much reluctance at having to take so unusual a course, recommended the rejection of the measure; and after this strong expression on the part of the Government, Mr. Cripps asked leave, on behalf of the promoters, to withdraw the Bill. This was accordingly done, amid the cheers of the opponents of the Company.

It is difficult to know what to think of the situation thus created. One must not forget that the South Metropolitan Bill is still alive, and that under the provisions of this measure, if they become law, the Gaslight and Coke Company's southern district may be sold to the South Metropolitan Company for a cash sum. As the matter stands, this Bill would place the vendor Company in the receipt of a considerable capital amount, which might or might not be sufficient to relieve them of their worst perplexities on this score. The Bill, however, is itself opposed, and may not pass. After what has happened, it would be waste of time and trouble to speculate as to what may occur in this connection. For the present, it will suffice to take note of accomplished facts; and anticipation of what may conceivably happen in the immediate future may rest. The last Chartered Bill has gone the way of the others—sacrificed, too, without a struggle. If the result is not tragic, it is a pity that such a fate was courted.

Mr. Corbet Woodall at the Southern District Meeting.

THE meeting of the Southern District Association last Thursday, under the presidency of Mr. Corbet Woodall, must be esteemed a brilliant justification of the wisdom of those members of the Committee who saw in inviting Mr. Woodall to the Chair the best available means of reviving interest in the proceedings. The attendance was large; and those who assembled to do honour to one of the most self-sacrificing of leaders of the profession, were rewarded by an interesting address, and refreshed by a highly successful dinner. The after-dinner speeches were exceptionally good; and the company had the privilege of hearing a suggestive discourse by Mr. James Mansergh, President of the Institution of Civil Engineers, who made a stirring appeal for professional unity. One would fain hope that the prospects of securing community of organization in the profession of gas engineering are bright enough to warrant the entertainment of a dim expectancy of the ultimate union of all engineers on the broad foundation sketched by Mr. Mansergh. Successful as Thursday's meeting was, and thoroughly as the members present appeared to feel the advantage, as well as the obligation, of assembling together in this way, it cannot be truly said that those who should form the backbone of the Society—the Metropolitan gas engineers—responded properly to the opportunity provided for their meeting in friendly counsel. There is something out of joint, somehow, in more than one respect, with the technical societies connected with the gas engineering profession. While some stand aloof, and others remain away, and these will not mix with those, it seems idle to talk of the prospects of greater unity than at present exists—which is little enough.

Mr. Woodall is so busy a man, and has to deny his attention to so many of those who would gladly engage it, that it must have been no small tax upon his time and energy to serve the Southern District Association as their President this year. Yet his matter and his manner of addressing the Society showed no signs of effort. He first challenged a certain order of opinion, by declaring that the calling of a gas engineer and manager is distinctly a good one for a competent man. He drew attention once more to the crowd of aspirants for electrical training, as compared with the paucity of satisfactory gas-works assistants, and remarked on the brighter prospects of the latter. Passing to the subject of improved public lighting by gas, which he long since made his own, Mr. Woodall uttered a vigorous appeal for the better lighting of the streets of London, which he compared disadvantageously with those of Vienna, Berlin, Paris, and Brussels. He gave some suggestive hints as to what might be done in England in the way of high-power incandescent gas lighting, which he referred to as an English speciality; and he concluded an inspiring address, spoken with the force of a master, with a passing reference to the economic position of the carburetted water-gas manufacture as influenced by last year's prices of coal and oil.

The Affairs of the Sheffield Gas Company.

THE ordinary general meeting of the Sheffield United Gaslight Company has been held, under the presidency of Sir F. T. Mappin. The Chairman delivered an interesting speech, as usual, recounting how the Company were affected by the general trouble of the coal trade last year. Sir F. T. Mappin corroborated the testimony of the Governor of the Gaslight and Coke Company as to the inferiority of the coal supplied at the tremendously enhanced prices charged since the coalowners contrived to get the upper hand of the gas companies. There is plenty of other evidence to the same effect available, if it were worth while to publish it; and the fact, which must be regarded as proved, is most discreditable to any colliery proprietors who perpetrated the swindle—for it is nothing less. Probably the gas companies feel sorer over the badness of the coal sent to them time after time last year than in regard to the dearness of it. After all, they may think, the somewhat unscrupulous way in which the coal people took their fullest advantage on the question of price was a matter of business. It is hard for anyone to say that a man who has something to sell shall not get the top price for it; but it would be difficult to find a valid excuse for the sharp practice of which Sir F. T. Mappin very justly complains.

The consumption of gas in Sheffield continues to increase at a rapid rate, which must be peculiarly gratifying to the Company, seeing that the Corporation are supplying electric light at "cutting" rates. The Gas Company have met this competition by pushing incandescent gas lighting; supplying the burners and mantles, and maintaining the lights at an inclusive charge of 4d. per point per month. This is the lowest rate for Welsbach burner maintenance ever heard of; but, although it can hardly pay by itself, it unquestionably does so in the long run. Too many gas companies fail to realize the expediency of actively pushing incandescent lighting, and seeing to the maintenance of the system. The latter is half the battle; and the difference in appearance between the lighting in a district where there is proper maintenance of burners, and where this is not regularly attended to, is most striking. It is not every gas consumer who cares to take the trouble of looking after mantles and seeing to the cleaning of the burner. Many incandescent lights have been dropped out of use on this score. Something happens suddenly; and the whole fitting is swept away—not to be replaced. Sir F. T. Mappin touched upon the subject of electrolysis, in regard to which he agrees with Mr. Livesey; and he concluded his speech with a strong defence of the manner in which the Company treat their workpeople. Altogether, the last meeting was an occasion worthy of the Sheffield Gas Company and the Chairman, whose grasp of the details of the undertaking appears to strengthen as he grows older. Certainly, the actual position of the gas supply of Sheffield is something for all concerned to be proud of; and those who know the business are not likely to forget the share of credit for this excellent state of affairs which is due to the Company's responsible staff.

Lord Salisbury on Parliamentary Interference with Industry.

THE Associated Chambers of Commerce have just held their annual meeting, under the presidency of Lord Avebury, who did not miss an opening for a renewal of his familiar

protest against the Socialistic tendency of much modern industrial and municipal legislation. He expressed the hope that the Joint Committee on Municipal Trading would be reappointed. Numerous resolutions respecting subjects of moment to commercial people were passed; and the interest of the proceedings culminated at the banquet, in a weighty speech by the Marquis of Salisbury. It is a remarkable feature of contemporary politics that almost the only "stern, "unbending" Individualist left among the ranks of active British Statesmen is the Conservative Prime Minister. The tradition of commercial and industrial independence left by the old Manchester School has died out elsewhere, and been supplanted by the later doctrine that whatever the majority of the followers of a trade ask for, even in restraint of commerce, they are entitled to receive from Parliament. The old school of Liberalism in politics, moreover, knew nothing of Municipalism as it is now understood; and Lord Salisbury has no faith in the idea. Like John Bright, he believes that the best treatment of industrial enterprise by Parliament is to leave it alone.

There was a curious ring of John Bright's almost forgotten independent spirit in Lord Salisbury's remark, on this occasion, about the tendency of Parliament to muddle too much in matters of trade. The old Liberalism and the modern Socialism are as wide as the poles asunder in their views of the proper scope of parliamentary interference in industrial affairs. Lord Salisbury suggests that over-legislation in the supposed interests of the community at large, and of the labouring classes in particular, may possibly have the result of discouraging capital which formerly would have sought employment in this country, and which either does so not at all now or with much less enthusiasm and keenness than formerly. The Premier went on to point out that this is a very serious and most formidable danger, because the philanthropic exuberance of parliamentary interference is something so noble, so attractive, that well-meaning people are apt to be enchanted with it, and to ignore the reactionary consequences which may conceivably follow. "One of the dangers in this "country recently noticed is that when we see an evil we "rush to its extirpation with such vigour and such deter-"mination, and adhere so long to the arguments and reasons "and catchwords which our new enthusiasm has generated, "that we fail to see that we are going too far; that there are "dangers on the other side even against any enterprise that "we may think it right to undertake; and that, unless we "stop in time to prevent ourselves from rushing upon these "dangers, we shall find that a more formidable set of evils "than we have ever had to face before will be confronting "us at last." And one of the evils in question would be the drying up of the flow of fresh capital into old trades or new enterprises by undue parliamentary interference with the conditions of its employment.

Lord Salisbury also said some wise things about the need for the improvement of commercial education. In view of the comparatively early age at which lads with their living to get in trade or industry must usually leave school for the purpose, Lord Salisbury remarked that specialization before leaving school is out of the question. That is a great truth; and it could be wished that all school authorities could be thoroughly indoctrinated with it. At present, where any attempt is made to improve the modern side of school teaching, this usually takes the illusory form of cramming the boys with a multiplicity of mangled "subjects." What is really wanted is more scientific and effective teaching of the old "elements," and therewith better disciplining of the mind, and training of the powers of apprehension and memory. The arts of reading, including the understanding of what is read, and writing, in a degree to be of service for the purposes of life, are much neglected in schools. The science of arithmetic, on the decimal and the natural bases, is scarcely taught at all, in the proper sense of the term. There is no reason why a boy of 16 should not be able to use logarithms reliably. What are usually styled the higher branches of the science of numbers are easier than the lower. As to the teaching of languages, Lord Salisbury was quite right in including Spanish among the modern languages which all boys ought to learn.

We would venture to dispute his dictum, however, which must assuredly have been uttered in haste, that the study of modern languages at school should precede Latin. If Latin were properly taught, as an example of a language possessing a grammar, and as containing the roots of those modern languages which it is desirable for Englishmen to know, there could be no better work for the school. Unhappily, it is not so taught; and therefore the subject has fallen out of favour with practical people. We should be inclined to class German with Greek, as a language to be taken up only with a view to some special after-study. And we would not have the German "*cursiv-schrift*" taught to English boys, on any consideration, while they are learning to form their own handwriting.

Suggested Reforms of the Patent Law.

THE Committee appointed by the Board of Trade to inquire into the working of the Patent Acts have agreed upon their report; and although the Blue-Book relating to the proceedings is not yet public property, certain of the more important recommendations of the Committee have leaked out. The general character of a patent grant is very well known, and not invariably to its advantage. Patentees have been heard to complain that the Government take their fees, and give them but little in return. A strong body of criticism is centred upon the point that patents are not guaranteed by the Government who issue them. This characteristic is not peculiar to English law. In France, the law is the same; and it is required that when an article is stamped "Patented," the significant initials "S.G.D.G." shall be added, in order to make it quite clear that no responsibility for the legal position of the patentee rests upon the Government. To the question whether such a responsibility can be assumed in connection with the grant of an English patent, the Committee are reported as answering emphatically in the negative. To the consequential inquiry as to whether anything can be done by the Office to mitigate the most glaring evils of the existing system, the Committee return a more hopeful answer. They think the present formal examination of applications might be extended to embrace novelty, in the light of the previous fifty years' complete specifications. The Examiners would not take account of anything else but anticipations by patents actually issued during the preceding fifty years; and the Committee are prepared to recommend Parliament to say that the publication of an invention in the specification of patents fifty years old, or in provisional specifications not followed up, shall not of itself be deemed an anticipation of the invention. This suggestion is on the lines of some foreign patent legislation, and was proposed in a Bill introduced a few years ago by Lord Alverstone, Mr. Fletcher Moulton, and Mr. Haldane. The idea appears to be just and reasonable.

Another of the recommendations will be found to deal with the vexed question of compulsory licences. The procedure which a would-be licensee must take under the Act is both cumbrous and expensive; and the Committee propose that the section should be repealed and the jurisdiction handed over to the High Court. This will be a great victory for those publicists who have cried out against such enormously important actions as those taken under the famous 22nd section being removed from the High Court. On the other hand, it is tolerably certain that the procedure of the High Court in such matters is not all that the parties interested might desire. At present, it is said, anyone who wishes for a licence to manufacture under somebody else's patent, and can show his *bona fides*, can ask the Board of Trade to intervene between him and the patentee, should the latter show a disposition to give trouble. If all business of this kind has to be entered in the High Court, as a matter of course, and be carried through the routine of a patent lawsuit, the lawyers may rejoice over the prospect; but the rejoicing will not be universal. The Courts undoubtedly sell good justice, but it is very dear; and the strength of many a patent lies rather in the depth of the purse of the holder than in its intrinsic merits.

Compulsory Provident Societies.

THE subject of provident societies instituted by employers for the benefit of their workpeople has again been brought before the public notice during the past week—first by the debate upon the Bill being promoted in Parliament by the Great Eastern Railway Company, and secondly by the report of the proceedings at the National Conference of Friendly Societies. The chief point involved in both debates was as to whether employers should be permitted to make it a condition of employment that their workpeople must become members of what is briefly entitled the "Shop "Club." It may be within the recollection of "JOURNAL" readers that close upon two years ago the whole question of

Workmen's Benefit Societies was discussed at some length in these columns, and the specific point of compulsory membership was fully dealt with in those articles. In view of the frothy stuff talked by some of the Labour members in Parliament last week—stuff which appeared to be easily—almost eagerly—swallowed in bulk by the labour-vote-fearing House—it may not be amiss to briefly consider the common-sense of the matter.

The chief argument upon which the Labour party rely in opposing compulsory membership is the "infringement of "liberty" involved. Of course, there is an "infringement "of liberty;" for every labour-hiring contract necessarily entails it. An employer engages a man to do certain duties during certain hours. The man is no longer at liberty to do as he pleases during those hours; he must obey orders, or forfeit his situation. Every man is free to take or leave a job that is offered him; but every job accepted involves a loss of liberty. So that, before it can be urged that an employer should be prevented by law from imposing the condition of membership of the shop club upon every applicant for employment, it must be shown that there is in that condition some inherent injustice such as existed in the system which the Truck Acts were passed to render unlawful. Is any such injustice involved? Yes, says the Labour member, because there is a bond created by these societies between man and master which prevents the former from being completely independent of the latter. That is just the reason of their hatred of profit-sharing schemes. The man has got some interest in his employment beyond the week's wages; and so he is not always so ready to go on strike when Labour "leaders" wish to justify their existence. A consummation strenuously to be fought against! Yet, are those men who have been brought to recognize that their interests are bound up with those of their employers, and that to serve the one is to serve the other, better or worse paid, in more or in less constant employment, than their "independent" brethren who think that they are doing a clever thing by taking thirty shillings for twenty shillingsworth of work?

The Labour member, however, does not admit that the bond created between man and master by the compulsory club is a beneficial one to the employee. He affects to look upon it as a mere dodge for hobbling the men, so that they cannot stray at will. That, of course, depends entirely upon the rules of the individual society; and it may be said that rules which decree complete and uncompensated forfeiture of membership in the case of men leaving the employer's service, or that prohibit membership of any other society, are distinctly unjust in their operation, whether membership be compulsory or not. But compulsory societies, taken as a whole—so far from being designed merely to fetter the men—are of very real benefit to their members, as, being generally assisted both financially and in respect to management by the employer, benefits can be granted higher proportionately to the subscriptions than in the ordinary friendly societies. Moreover, men belonging to a shop club are less likely to lose their situations in consequence of illness than are those having no such connection with their employment. It is, further, a very real kindness to many men to oblige them to join a shop club, as otherwise they would make no provision for themselves or their families against times of sickness or death.

We would ask the liberty-worshipping Labour members: If compulsion to join a benefit society be such a terrible thing—such an infringement of liberty—why do the Trade Unions make membership of themselves so strictly a condition of employment in many industries? Mr. Bell is very indignant with the Great Eastern Railway for wishing to compel their employees to benefit themselves. Does the Railway Servants' Society carefully avoid every semblance of putting pressure on those employees? Briefly, compulsory membership of a benefit society is a very good thing for employees, and involves no injustice, provided that no uncompensated forfeiture of membership is involved by leaving the employment, and that the men are free to join any other societies they please. Mr. Keir Hardie is reported to have said in the House that "working men could not con- "tribute to more than one benefit society." Mr. Keir Hardie is either singularly ignorant of the subject, or he assumed that his hearers were. Anyone who knows the elementary facts of the case could contradict him with chapter and verse. It is a pity that no one in the House of Commons had both the knowledge and the courage required to tackle the demagogues who led it by the nose in the matter of the Great Eastern Railway Bill last week.

WATER AFFAIRS.

The New County Council in Action.

ELATED by their success at the recent election, the Progressive party in the new County Council have lost no time in making a further declaration of their policy on the question of the Metropolitan Water Supply, to the acceptance of which by the ratepayers that success, as they claim, was mainly due. Consequently, at the first meeting of the new Council last Tuesday, Mr. M'Kinnon Wood moved that a deputation should be appointed to urge upon the President of the Local Government Board the advisability of the Government allowing the Council's Purchase Bill to be read a second time and be referred to a Select Committee. In support of his motion, he contended that the people of London have shown, by their verdict at the election, that they are desirous that the control of the water supply should be in their hands, and are determined not to wait any longer for a settlement of the apparently interminable Water Question. All the Progressives wanted was, he said, that their scheme should be considered by a Committee upon its merits, and be accepted or rejected as might be deemed best in the interests of London. Against this strong plea for an impartial investigation, all that the Moderates could do was to controvert the assertion that it was the water policy of the Council upon which the election turned, but simply upon a detail incidental to the supply; and that therefore it would be useless and impolitic, and only add to the great waste of the ratepayers' money which has already been incurred over this matter, to attempt to force upon the Government the opinions held by the majority of previous Councils, in face of the unanimous recommendation of the Royal Commission in regard to the formation of a Water Trust. It was scarcely to be expected that this counsel would find favour. In the result, it was decided by 91 votes to 7 to wait upon Mr. Long, and endeavour to urge upon him the necessity, in view of recent events, of expediting a settlement of this question, and, as an initial step, to remove the obstacle he has placed in the way of the Council's Bill. We do not for one moment believe that the result of the election will influence the right honourable gentleman in the slightest degree. In this question, as has often been pointed out, other interests are concerned besides those of London and its representative body; and Mr. Long will no doubt give them all due consideration in the Bill he has promised to introduce next session. Before that measure is drafted, he will hear what the outside authorities have to say; and already the Corporation of the City of London have intimated their intention of interviewing him on the matter. The Council's Bill is down for second reading next Monday; but, inasmuch as the House of Commons last Thursday expressed in a very unmistakable manner their opinion of a measure in which definite recommendations by a Select Committee had been "flouted," we question whether the members will sanction one in which a similar attitude has been assumed by the promoters towards those put forward, after exhaustive inquiry, by a Royal Commission.

Conservation of Watershed Areas.

THE parliamentary campaign, as far as readers of the "JOURNAL" are concerned, was opened last Tuesday, on the motion for the second reading of the Wolverhampton Corporation Water Bill; and the result was the defeat of the promoters. It was quite expected, from the strenuous opposition which it was known the Bill would encounter, that there might be some difficulty in getting it into Committee; but it was hoped that the extraordinary exertions put forth by those who had charge of the measure would be successful in carrying it thus far. They would probably have been, had it not been for the intervention of an extraneous force. The circumstances may be stated in a few words. Wolverhampton has always been a troublesome place to supply with water, owing to its altitude; and at the present moment some 15,000 of the inhabitants, as well as several large factories and breweries, either have no water at all, or only a totally inadequate quantity. What was the duty of the Corporation under such circumstances? Obviously, to endeavour to improve their supply; and this they purposed doing by constructing additional works at a cost of £200,000—not for the service of the borough solely, but for supplying several parishes in both Staffordshire and Shropshire, in the latter of which counties the pumping

station was to be located. There are no streams in Wolverhampton; and consequently the Corporation had to go elsewhere to find water. It is said that they kept their proposal secret as long as they could; but when it became known, it roused not only all the landowners, but, according to Colonel Kenyon-Slaney, who made a powerful speech on their behalf in the debate, every Parish Council in the area concerned. He brought a strong accusation against the Corporation, of taking all the water they could get, and refusing to give any compensation—doing this, moreover, in anything but courteous terms. Compensation was, however, provided for by the Bill, as well as the purchase of plant by any local authority desiring to do so.

The position of the Corporation in relation to the Birmingham water scheme was a by no means unimportant feature of the debate, as, under the Act sanctioning that scheme, Wolverhampton can obtain a supply; and therefore, as Mr. Chamberlain remarked, the material interests of the Midland capital were against the Bill. At the same time, recognizing Wolverhampton's difficulty, he thought the opposition of the outside authorities ought not to be allowed to stand in the way of its removal. He considered that the Bill should go to a Committee accompanied by an expression of the opinion of the House, conveyed in the form of an Instruction, that ample protection should be afforded to the districts affected in regard to their future water supply. Sir Alfred Hickman pointed out that the promoters would be able, if the Bill were allowed to go forward, not only to provide for the town of Wolverhampton and its present water area, but for the whole of the district proposed to be affected. The Corporation had, indeed, pledged themselves to do this; and they were prepared to redeem their pledge on whatever terms a Committee might consider fair and reasonable.

After such a declaration as this, one would have thought the Bill would have been allowed to go before the tribunal suggested, where all parties would have been justly dealt with; but when the division was taken, after a debate which lasted two hours and a half, the motion for second reading was lost by a majority of 85 in a House of 393. In the majority figured the "extraneous force" already alluded to—60 members of the Irish Nationalist party, who certainly could not have had any special interest in the needs of Wolverhampton in regard to water, or in the question of the conservation of watershed areas to the residents therein. It was, of course, simply antipathy to the honourable members for Birmingham and the borough principally concerned which prompted them to go into the opposite lobby. The loss of the Bill is a serious matter for Wolverhampton; and the Corporation will now have to fall back upon one of the alternative schemes which they are understood to have in reserve. As a last resort, they will be able to obtain water from the Birmingham Corporation, though they will have to wait three years for the completion of the Welsh scheme. The important point in connection with the rejection of the Bill seems to us to be the manifestation by the House of Commons—or rather, we should say, of its English members—of a keener desire than has hitherto been displayed to protect rural districts from the encroachments of large municipalities in the direction of appropriating water areas. It will be interesting to watch for any further development of this feeling.

Fire and Water in New York.

On Monday last week, the water famine from which New York has lately been suffering was brought to an end—to the intense satisfaction of the inhabitants—by a heavy downfall of rain, which, while it furnished a much-needed supply of fluid, caused considerable damage in certain sections of the city. According to the accounts which have reached us, New York has been passing through a crisis such as we in London, badly as we are supposed to be served by the Water Companies, have rarely, if ever, experienced. We have in previous issues alluded to the defective condition of the water-mains; and our Correspondent in the city has recently forwarded some startling evidence on this subject, which we regret to be unable to give in the present issue. We will not detract from the interest of his communication by quoting from it now, but will just refer to one matter, as it bears upon the late short supply. What the Water Department styled "only a little leak" of about a million gallons per diem has just been discovered; and it is said that there are fifty like it. The Department have certainly something to answer for; and they should be made to do it. Before the welcome rain came, a big fire broke out which caused damage to the extent of $2,000,000, owing to the size of the mains and the supply of water being inadequate; and had it not been for assistance rendered by the large fire-boats, it is estimated the amount involved would have been ten times as great. Here, in London, however dry the weather may be, the high-pressure water-mains are always kept charged; and when, a few years ago, a serious fire occurred in Aldersgate Street, the New River Company furnished for its extinction, if we remember rightly, the entire contents of a reservoir, for which they did not receive a single penny. In some respects, therefore, we are not very much behind the so-called go-ahead city whose Fire Brigade is held up to the admiration of the world.

ESSAYS AND REVIEWS.

ELECTRIC LIGHTING MEMORANDA.

The Truth about the Electricity Business—The Dropping of the Mask—Why Electricity Supply Does Not Prosper in England—No Money for Electricity-in-Bulk Schemes.

Particular attention should be given by all those who are interested in the gas industry of the United Kingdom to the remarkable conclusions indicated in, and suggested by, the paper read by Mr. W. L. Madgen before the Institution of Electrical Engineers, and discussed in a special article appearing in another column. Almost for the first time in the history of the electric lighting industry, on this occasion a gathering of electricians was treated to the truth of certain matters, notably of their failure to make any serious impression upon the contemporary gas industry, in regard to which it has been their custom to pretend to think differently. As is explained elsewhere, the proceedings at the meeting amounted to the disclosure of a split between the representatives of the new departure in electricity supply, who may be distinguished as the electrical "power in bulk" division, and those electricians who are identified with electric lighting undertakings, especially municipal, established under the Electric Lighting Acts. The former now find the statutory privileges of the latter an obstacle in the path of their progress, which they affect to believe would otherwise be assured. The latter reply with spirit that this is a shallow pretension; and that the real hindrance to the expansion of the business of electricity supply in this country, in bulk or by retail, is the cheapness of gas.

This admission, forced as it was out of men who would never have published the statement save in self-defence, has had the effect of a lyddite shell exploded in the electricians' camp. It was tantamount to a confession that the so-called parochial order of electric lighting engineers have been "making believe" all along, when they pretended that their electricity could ever be the poor man's light, and that now they are willing to drop this hollow mockery, and at the same time to strip the mask from their younger rivals of the same household. "What is the use," they cry, "of your abusing the Electric Lighting Acts, and the Board of Trade, and the municipal electric lighting committees, and so forth, when the real trouble is that the gas supply of the country is too cheap and abundant for you to compete with?" If people do not want electricity, in bulk or by retail, at the only prices at which they can get it, where is the use of continuing to ignore the fact?

The comments of the electrical journals upon this upsetting of the electrical cart are interesting. The "Electrical Review" repeats the statement that the mere increase of English gas companies' revenue for the years 1896 and 1898 exceeded the sum total of all the electricity businesses; and it remarks: "That should have gone into the pockets of electrical engineers." Should it? It is a funny observation to make; because, of course, the increased gas revenue in question did not go into the pockets of gas engineers. It was not all profit for anybody; but such profit as there was in it went to remunerate the capital sunk in the business. Our contemporary will not see that the enormous preponderance of the gas industry in bulk, and its greater vitality as compared with the electrical industries, must be attributable to something good in itself. On the contrary, it prefers to ascribe the relative sluggishness of the latter to the existence of unfavourable external influences and statutory conditions. Some years ago, it is confessed, people might have referred this backwardness to the insensate speculation in electrical business in 1882; but that excuse is too ancient. The amazing suggestion is made that it is all the fault of the Board of Trade in encouraging municipalities to provide their own electric lighting. "The new industry being in the hands of municipalities who could not speculate, things proceeded very slowly." The excuse is too thin. Are there not many electric lighting companies working the business for all it is worth. How is it they do not gather up the municipalities' slack?

The uncomfortable suspicion has been created that the electricity-in-bulk generating schemes have no adequate justification in fact. A set of smart electrical gentlemen would greatly like to direct any number of such ventures; and the expense of obtaining a handful of Acts sanctioning this kind of venture has been incurred in the hope that it will be recovered, with a margin, in due

time. But the investing public are shy. The evidence that suffices to pass an enabling Act through Parliament—especially if its purpose is declared to be to extend industrial enterprise along lines which are clamorously recommended by advocates who have the ear of the public—will not be enough to draw money out of the pockets of people who wish to have a reasonable assurance of an adequate return upon it. Notwithstanding all the adjurations addressed to the British Public not to let America, or Switzerland, or Italy leave England in the lurch in the matter of electric power generation and transmission on the grand scale, the moneyed portion of this same public display no rash haste in putting up the necessary funds for the electricity-in-bulk pioneers to play with. Part of the proceedings at Mr. Madgen's meeting disclosed the reason why. How is it that nobody is able to state positively the relative economic possibilities of transmitting electric power and sending coal? Professor Ayrton did something to prick the bubble, by recounting how in the only actual attempt it had fallen into his power to make for purchasing electricity in bulk, the price quoted to him was prohibitory. He has since written a letter to the "Electrical Review" protesting against the empty abuse heaped, by some speakers at the meeting, on the recommendation of Sir James Kitson's Committee, and suggesting, without special reference to any particular statement, that "the 'accuracy factor' may be defined as the ratio of truly what it is to apparently what it is." This is a hard saying.

THE GAS AND WATER STOCK MARKET.

(For Stock and Share List, see p. 768.)

TAKING the departments all round, business on the Stock Exchange last week was rather dull and uninteresting. The settlement preoccupied attention to the exclusion of fresh business. The reopening of mines in South Africa has had a good effect, indicating the official belief in a prompt termination of the war; but at the close the Russian incident at Tientsin had an unpleasant result. If we except the American department, prices almost throughout finished off lower. The tendency in the Money Market was not altogether free from fluctuation. There was a good demand, which was met without difficulty; but the position at the close pointed towards pronounced ease. In the Gas Market, business in the earlier portion of the week was decidedly quiet, though now and then a stock not usually much dealt in would break out into marked activity, and then subside into its ordinary repose. Towards the close, however, considerable attention was directed to Gaslight ordinary, owing to the Company's Bill in Parliament being withdrawn, in the face of the overwhelming force of the opposition to it. Among the secured issues, the maximum advanced a point. Hardly anything was done in South Metropolitan, and the quotation eased down. Commercials were unusually active, and both issues were advanced. The Suburban and Provincial groups were almost devoid of business; and in the London market nothing moved. Locally, however, Liverpool United had a nice advance. The Continental Companies also were very inactive; but the tendency generally was firm, and Union and European had each a rise in quotation. Among the remoter undertakings, Buenos Ayres recovered its fractional fall. The tendency of the Water Companies was towards lower values; but changes in quotation were few and very slight—being confined merely to a couple of points in New River and Southwark.

The daily operations were: Business in Gas opened on Monday without much activity, but with indications of firmness. Commercial old and new and Gaslight maximum rose 1 each, and Continental Union 1, and ditto preference 3. In Water, New River and Southwark fell 2 each. Tuesday was quiet; business being mostly in Commercials—the new stock rising 1. Wednesday was a very quiet day. Both Europeans advanced ¼, and Buenos Ayres ¼; but Gaslight ordinary and South Metropolitan receded 1 each. Thursday was no busier, and nothing moved. On Friday and Saturday, there was extensive dealing in Gaslight ordinary, to the almost total exclusion of every other stock. Prices were weak, but quotations remained unchanged.

THE ACTUAL STATE OF THE BRITISH ELECTRICITY SUPPLY INDUSTRY.

BEFORE the Institution of Electrical Engineers, a few weeks ago Mr. W. L. Madgen read a paper to which he confessed his inability to give a satisfactory title. Its subject was the movement, which culminated in some Private Bill Legislation last session, for supplying electric power in bulk. The difficulty of fitting a proper title to the paper grew out of the motive with which it was written. Perhaps the nature of this motive can be best described for our readers, who might not see the text of the paper in the ordinary course of their reading, by the statement that it was the protest of the greater electrical enterprise against the cramping parochialism of the Electric Lighting Acts, which have reduced the electricity supply of towns to the condition of a pawn in the game of Municipalism. Consequently, gas engineers will perceive in the paper, not without a feeling of inward satisfaction, the sign of a split among the electricians themselves over the partition of the spoil, which was certain to come sooner or later. Ever since the second Electric Lighting Act was passed, local authorities, great and small, throughout the United Kingdom have been badgered by electricians, either to apply for Electric Lighting Orders themselves, or to consent to Orders being obtained by enterprising firms in the business. It seems almost an insult to the intelligence of our readers—most of whom have personal experience of the annoyance caused to their townsfolk by these incessant "alarms and excursions" on the part of electricians—to remind them that down to about the year before last this kind of thing was universal, and indeed constituted all the electrical "enterprise" there was in being.

The only question arising in connection with this incessant agitation was as to whether the town should apply for its own Order, or leave it to one of the numerous speculators who served notices broadcast yearly of their intention to take proceedings under the Acts. These adventurers did not usually mean business; but they frequently frightened municipalities and district councils into taking steps themselves, which would never have been sanctioned by local opinion but for the prevalence of a natural wish to preserve the town from foreign invasion. It was a great mistake that the Electric Lighting Acts did not require a substantial deposit of cash to accompany formal notice of intention to make application for an Order. Such an obligation would have proved a quietus to the adventurers who made a practice of stirring up in this way every local authority in the land once a year at least. We have no desire to advertise the firms who went in for this line of exploitation, and still keep at it; but they will readily recur to our readers, who have suffered from this "policy of pin-pricks" for years.

It is not every Little Peddlington which is sufficiently aware of its own insignificance to treat these forced incitements to jealous action with the calmness of contempt. More often, upon the receipt of a formidable-looking intimation from some loudly-named electrical engineering company, of whom the townspeople had never heard, of the intention of the company to apply for an Electric Lighting Order for the district, the poor little local authority has been painfully flurried. The local newspaper usually helped to fan the excitement, by publishing grandiloquent articles upon the growing importance of the town, to which this outside attention must have been due, and generally adjured the townspeople to show themselves Progressive in the matter.

In scores of instances, the result was an application for a Provisional Order by the authority itself, at a cost to the ratepayers of about £150, which the unhappy surveyor probably wanted badly for his roads. The Order was granted by the Board of Trade as a matter of course. What we particularly wish to emphasize in this familiar story is that this sort of proceeding was always reputed at the period to be "Progress." Our electrical contemporaries religiously reckoned all these applications, and chronicled them as furnishing proof of the growing popularity of electric lighting. And, of course, the old saying that "one fool makes many," was duly justified by this performance. The more applications for Orders that went in, the greater the pressure on the outstanding authorities to join the procession. After the Order had been granted, a new set of experiences began for the local authority. There was no longer the eagerness on the part of foreign speculators to take on the job of lighting the district at their own risk; but the number of "consulting engineers" who wanted to send in a report on how the town could do it was highly flattering to the local authority's sense of importance. It was all done in the name of enterprise. The electrical journals hailed every such job that was brought off by the clever "consultant" as one more nail in the coffin of the gas industry. Scores, hundreds of commendations of this sort could be disinterred from the back numbers of newspapers and technical publications. There were four of these petty municipal electric lighting installation to one venture of a company; and electrical opinion applauded them all.

Now, mark the change that has come over the spirit of the electrical partisan's dream! He has suddenly awakened to the perception—which we have expressed in these columns all along—that these twopenny-halfpenny municipal electric lighting affairs are a mistake, and an obstacle in the way of sound business. Thus we find the "Electrical Review" roundly abusing Parliament for passing the Electric Lighting Acts, under which all this once-lauded municipal enterprise was fostered, greatly to the delight of those who held that the more electric lighting there was in the country the better. It might at least have remembered that a good many axes have been ground under the particular parliamentary dispensation which is now vilified. The "Electrician" is wiser. It admits that the parochial scope and character of the Electric Lighting Acts was the natural expression of the state of contemporary knowledge of the capabilities of commercial electricity supply, and only condemns the monopolist turn given to this legislation, following the precedent of the Tramways Act, 1870. This, again, is nothing but "hindsight," which is ever so much clearer than foresight. But for this monopolistic municipal intention of the Acts of 1882 and 1888, there would not have now been nearly so many electricity supply undertakings in the country. To argue that this would have been all the better, does not come well from those who have hitherto applauded every venture of the kind as so much won from the territory of the gas industry.

The day dawned, however, about two years ago, when the best electric engineering opinion went over to the view that all this

sporadic and parochial style of electricity supply was a mistake. The opposite view was favoured in the most select professional circles, that the future of the industry depended upon its being allowed to break away from municipal leading, and to do things on the wholesale scale. Parliament accepted the new development, on the condition that vested interests should be respected; and the immediate fruit was various electricity-in-bulk Acts. The next result is the split between the "bulk" electricians, and the electricians of the "parochial" school. The latter have hitherto done all the work; and have not fared badly out of it. They also used to be looked upon as men of light and leading in their order and generation. They posed as the agents of progress, and were accustomed to read flattering notices of themselves in the technical and general press. They consequently feel hurt when upstarts like Mr. Madgen stigmatize their work as so much obstruction. The worst of it is that these new-fangled electrical advocates speak of the poor little municipal undertakings, that can never pay, just as though they were mere gas engineers.

Mr. Madgen says that these small local electricity supply ventures suffer from the following disadvantages: (1) Small field for development. (2) Relatively low load-factor. (3) Cost of fuel, handling it, and water supply depend on immediate local conditions, favourable or unfavourable. (4) High running costs, management expenses, and maintenance; the costs per unit sold being generally higher the smaller the station. (5) High relative cost of machinery per kilowatt installed, and lower economy in running. (6) Rents, rates, and taxes relatively higher. (7) Extension of buildings is expensive, particularly in town sites. (8) High charges for electrical energy for all purposes as the result of these disadvantages. These are the considerations that the enterprising gentlemen who are in the habit of advising small municipalities to pledge the credit of the ratepayers in this business never mention. They leave them to be discovered later.

In the discussion on Mr. Madgen's paper, the men of the new departure had it all their own way at first. They told one another how ridiculous it was to think of local authorities, just because they were local authorities and regardless of the size of their district, having the power to veto these grandiose schemes in which they were all so interested. Professor Sylvanus P. Thompson even adduced the historic Aldgate Pump surviving to this day—a relic of times when every parish had its own water supply—as a type of the kind of electricity supply undertakings favoured by the existing Acts of Parliament. But these gentlemen reckoned without Mr. Robert Hammond, who threw in the face of his astounded auditory the statement that the true reason why electricity supply has proved so sluggish in this as compared with other countries is the cheapness of gas! The bold assertion was received with all the scorn it merited from the Institution of Electrical Engineers. Mr. Sydney Morse almost gave Mr. Hammond the "lie direct." Mr. E. Garcke said unpleasant things about Mr. Hammond's career from business man in the City to Consulting Engineer in Westminster; and he set against his new confession the well-worn dictum of Sir W. Preece about electricity being the poor man's light. Mr. Garcke forgot the Maidstone qualification of this generality. Several other professional electricians also fastened upon Mr. Hammond; while some left him so severely alone that it might be inferred how nearly he had gone to "exposing the trick."

This, therefore, is the position of affairs opened up by Mr. Madgen and his opponents. The electrical industry in Great Britain has fallen upon evil days—the assertion is not ours, but is made by the "Electrical Review." In endeavouring to account for the fact, Mr. Madgen abuses the Municipalism of the Electric Lighting Acts; and he is allowed to "have reason" by gentlemen like Mr. R. Percy Sellon, Mr. J. S. Raworth, and Mr. Swinton, whose names are not unfamiliar in connection with big electrical ventures. Mr. Raworth, however, has a habit of blurting out the truth; and he reminded his audience that while they were very busy persons, and thought the business in which they were engaged ought to be prospering, the *increase* of the gas companies' revenue between 1896 and 1898 exceeded the gross total of the revenue of all the electric light and power companies of the kingdom for 1898—the last year for which complete returns are available. This startling reminder of the amount of the lead of the gas industry, as compared with electricity—a lead which does not show any indication of decreasing—prepared the way for Mr. Hammond's even more crushing statement. It was further admitted that there is a greater difficulty in getting money for new electrical developments than in passing them through Parliament. Professor W. E. Ayrton, also, declared point-blank that a beautiful opportunity he had had for carrying out the idea of the transmission of energy by means of electricity in bulk had proved disappointing; because the people who might have supplied the current from a distance of 2¾ miles wanted 3d. per unit for 500-horse power delivered. It came cheaper to build works and carry the coal to the spot. This candid testimony was terribly damaging to the cause advocated by Mr. Madgen. Altogether, the transactions of the Institution on this particular occasion convey more comfort to those outside than to those within its magic electric circle.

We have received from Messrs. Macmillan and Co., Limited, "Photometrical Measurements and Manual for the General Practice of Photometry, with Especial Reference to the Photometry of Arc and Incandescent Lamps," by Wilbur M. Stine, Ph.D., Professor of Engineering in Swarthmore College.

PERSONAL.

Professor Ivison Macadam has been appointed to succeed his father, the late Dr. Stevenson Macadam, as Lecturer on Chemistry in Surgeons' Hall, Edinburgh.

Mr. R. Hesketh Jones has resigned the Chairmanship and his seat on the Board of the Waterford Gas Company. Mr. George Anderson has been appointed thereto.

Mr. Hubert Russell, of Holmfirth, has been appointed Gas and Water Engineer to the Newton-in-Makerfield Urban District Council, in succession to Mr. D. H. Lloyd.

The Leamington Corporation have just chosen Mr. T. Berridge, Engineer and Secretary of the Gas Company, as one of the Managers of their Technical Schools. It was considered that, as Mr. Berridge had been for some years a member of the Derby Technical Instruction Committee, he would be a valuable addition to their Committee.

At the last meeting of the Institution of Civil Engineers, the transferences from the class of associate members to that of members reported included the name of Mr. H. Fillmer Rutter, of the West Middlesex Water-Works, Hammersmith. The monthly ballot on the same occasion resulted in the election of Mr. G. T. Beilby as an associate.

The South Staffordshire Water Company possess in Alderman Richard Williams, a member of the Board, one of the most striking personalities in the civic, social, and industrial life of the Black Country. Alderman Williams, who is familiarly known as the "Grand Old Man" of Wednesbury, not long since attained his 84th year; and on Saturday last he celebrated his diamond wedding. He was born on Jan. 3, 1817, and has consequently lived in five reigns.

At the last monthly meeting of the Bolton Town Council, suitable recognition was made of the services rendered by Alderman Miles upon the Gas Committee, of which, during a period of about twenty years, he was first Vice-Chairman and subsequently Chairman. The latter position he has lately resigned; and the formal communication of the fact to the Council evoked expressions of gratitude on the part of the members—a feeling which it was believed was shared by the ratepayers—for the good and useful work he had done. Alderman Miles has been appointed a member of the Water and Finance Committees; so that his services will not be lost to his fellow-townsmen.

OBITUARY.

The death is announced of Mr. William Maberly, Secretary of the Lambourn (Berks) Gas Company.

Mr. Gavin Paul, of the firm of Gavin Paul and Sons, Limited, coalmasters, of Edinburgh, died at Marseilles on the 9th inst. He had been long in feeble health. His remains were interred at Edinburgh last Friday.

By the death of Mr. Robert West, on the 13th inst., at Lichfield, an old servant of the gas industry passed away. He was the eldest son of the late Mr. Thomas West, gas-meter manufacturer, of Oldham. His experience as a Gas Manager extended over a considerable period. For many years he was Manager to the Guildford Gas Company; and subsequently filled the same office in the Elland-cum-Greetland Gas Company. His services were then transferred to the Lichfield Gas Company, and his connection with that concern ran over 24 years. He died at the age of 74 years.

The death occurred recently, in his 75th year, at Paisley, of Mr. James Donald, of the well-known engineering firm of Messrs. Hanna, Donald, and Wilson, of the Abbey Works in that town. He was in early life Engineer of the Paisley Water Company; but in 1851 he became a partner in the firm of Messrs. Reid and Hanna, gas engineers and iron boat builders, which had been established in Paisley since 1816. The constitution of the firm was, on Mr. Donald's accession, entirely changed, as well as the title, which then became Messrs. Hanna, Donald, and Wilson, under which style the business of the firm has since been conducted. In 1880, Mr. Donald and his three sons became sole partners, and the management has since been wholly in their hands. Originally mere millwrights, Messrs. Hanna, Donald, and Wilson developed an engineering business of astonishing variety. Notable examples of their work are large gasholders for the Glasgow Corporation, and capacious water-towers for Brazil.

The Franklin Institute has held a discussion on the electric distribution of power in workshops, with the object of throwing light upon the advantages and drawbacks of the new fashion of driving power machinery and tools. Professor F. B. Crocker said that the rapid increase of the practice must imply the possession of important advantages to the user, which he summarized under the heads of: Saving in power; cost of buildings; cost of equipment; arrangement of tools; clear head-room; cleanliness; health of workpeople; convenience of detached buildings; freedom for growth; shut-downs less frequent and serious; speed control; increase of output. One of the special advantages is that the tool can be taken to the work and used in any position, instead of requiring perhaps a heavy casting or forging to be carried and adjusted in position to suit the fixed belt-driven tool.

TECHNICAL RECORD.

SOUTHERN DISTRICT ASSOCIATION OF GAS ENGINEERS AND MANAGERS.

The Annual Meeting of the Association was held on Thursday, at the Holborn Restaurant, High Holborn. The occasion was of more than ordinary interest, inasmuch as it marked the opening of Mr. Corbet Woodall's occupancy of the Presidential chair. Members came from all parts of the Association's extensive territory to welcome their new President; and among those who were there were many old members whose presence of late years has been very occasional, but who were more frequent attendants in those days long since when Mr. Woodall was able to take a more active share in the work of the Association.

At the commencement of the proceedings, Mr. A. E. Broadberry (Tottenham), Past President, occupied the chair.

Induction of the President.

The Chairman said his first duty was a very short one; and it was to explain his position in occupying the chair. He could best do this by reading a letter which Mr. Woodall had received from Mr. D. Irving, the retiring President. It was as follows:—

It is a matter of very great disappointment to me that I shall not have the pleasure and honour of installing you to-morrow in the chair of the Southern Association. Mr. Fiddes is still absent from business; and we have a very important Board meeting at which I am required. I tried to get our date altered; but it was found unworkable. Under these circumstances, I am sure you and the Association will excuse my absence. The meetings of the Association have always afforded me the greatest help and pleasure, especially the Committee meetings; and I feel very grateful that you are able to give us your help and influence.

He (the Chairman) was sure that all the members regretted Mr. Irving's inability to be present at the meeting, and to have had the honour of installing his successor. That duty therefore fell upon him (Mr. Broadberry); and he felt it difficult—in fact, impossible—to find adequate words with which to welcome their friend, Mr. Woodall. He was sure, as he took the chair, the members would heartily demonstrate their welcome.

Mr. Woodall, on taking the chair, was very enthusiastically received.

The Honorary Secretary.

The President said he was exceedingly obliged to the members for the cordial welcome they had given him to the chair. His first duty was to explain the absence of their esteemed Hon. Secretary (Mr. J. W. Helps). He had received from him a telegram, saying that the condition of his wife's health was such that it was quite impossible for him to come to the meeting. As the members were aware, Mr. Helps had suffered great anxiety with regard to his wife for a long time; and he (the President) was quite sure the condition of her health must be very grave to keep him away from the meeting, where, he (the President) was convinced, his heart would be. Under the circumstances, he thought that, instead of the usual vote of thanks to the Hon. Secretary, he would ask the members to express their sympathy with Mr. Helps in his anxiety, and their hope that he might have better news very shortly.

Mr. T. May (Richmond) remarked that it was a grief to all the members not to see Mr. Helps that day, especially knowing the cause of his absence. He had pleasure in seconding the proposal that a vote of sympathy be sent to Mr. Helps.

The motion was unanimously agreed to.

The President said he should like to say how much obliged he personally was, and he was certain all the members were, to Mr. Douglas Helps, who had taken his brother's place at half-an-hour's notice, and who had, he thought, very successfully made the arrangements for the meeting.

The Minutes.

The minutes of the meeting held in November last were taken as read, and confirmed.

Annual Report.

The Acting Secretary (Mr. D. H. Helps, of Redhill) then read the annual report of the Committee. It was commendably brief, and is therefore given *in extenso*—

The Committee have pleasure in presenting their twenty-sixth annual report on the working of the Association under the presidency of Mr. D. Irving, of Bristol.

During the year the Association has lost two members by death—Mr. T. W. R. White, of Sherborne, an original member and Past President of the South-West District Association; and Mr. J. H. Carvosso, of Dartford.

There have been four resignations, and two names have been removed under Rule 20. Nine additional members have been elected during the year, making a net gain of one, and a total membership of 153.

The usual meetings have been held during the year. That on the 1st of March, at the Holborn Restaurant, will be remembered as a day of national rejoicing over the news of the relief of Ladysmith. The President, in his address on that occasion, among other matters of interest, gave us the benefit of his valuable experience and investigations on the somewhat mysterious actions leading to the spontaneous combustion of coal.

The summer meeting at Bristol was of a most enjoyable nature, and the members of the Association owe Mr. Irving a debt of gratitude for the splendid hospitality extended to them on that occasion, and also for his paper on "Electrolysis in Gas and Water Mains."

At the November meeting in London, the business was as usual, three papers being read; and the Association is to be congratulated on the vigorous discussion they provoked.

Mr. G. P. Lewis, of Sydenham, in "Notes on Purifier Construction," dealt chiefly with dry-sealed covers; Mr. F. G. Cockey described some difficulties met with in the construction of a concrete gasholder tank; and Mr. A. W. Onslow, of Woolwich Arsenal, gave a very interesting description of an installation of incandescent lighting with gas at a very high pressure.

The Committee have been pleased to observe that the members have responded to the appeal made to them at the last annual meeting, and have shown their interest in the Association by a better attendance at the meetings, and their appreciation of the papers presented by joining freely in the discussions; they hope that these signs of vitality will be even more strongly marked during the current year.

The Committee have again been able to present to every member not in arrear with his subscription, a copy of the volume of "Transactions of the Gas Associations," which absorbed a sum of £37 10s., and it will also be remembered that at the meeting held in March last year a sum of £10 10s. was voted from the funds to the Mansion House Transvaal War Fund.

The balance standing to the credit of the Association at the beginning of 1900 was £107 11s. 4d. The total expenses during the year amounted to £83 0s. 3d., and the receipts to £75 1s. 6d.; leaving a balance to carry forward of £99 12s. 7d.

Mr. H. H. Jones (Wandsworth) moved, and Mr. T. Price (Walton-on-Thames) seconded, the acceptance of the report.

The motion was unanimously adopted.

Thanks to the Retiring President.

The President said his next duty was to propose a vote of thanks to Mr. Irving for his services in the chair during the past year. It was not his (the President's) advantage and pleasure to attend any of the meetings of the Association last year; but he thought the report that had just been read was a very fair testimony to the efficiency with which the work of the Association, and that portion of it particularly which devolved upon the President, was accomplished. He knew it would be to their late President a very great source of regret that he was compelled, through force of circumstances, to be absent. They had heard in his own words how considerable was the interest he felt in the success of the Association. He (the President) therefore wished to propose that their best thanks be given to Mr. Irving for his services to the Association during the past year.

Mr. F. Smallbone (Woodford), in seconding the motion, remarked that the success of the past year was largely due to the action taken by their late President. It had certainly been one of the most enjoyable and advantageous years in the history of the Association.

The motion was heartily agreed to.

New Members.

The Acting Secretary read the nominations for membership, as follows: Mr. H. E. Jones, of London; Mr. Eli Bull, of Pinner; Mr. C. Vincent Bennett, of Herne Bay; Mr. Henry Woodall, of Westminster; Mr. R. Bruce Anderson, of Westminster; and Mr. John Meiklejohn, of Aldershot.

On the proposition of Mr. F. W. Cross (Lea Bridge), seconded by Mr. C. F. Ruggles (Leighton Buzzard), the gentlemen named were elected members.

Alteration of Rule.

The President said the *agenda* contained a recommendation of the Committee that Rule 9 should be altered to read: "The annual general meeting shall be held in November, and the ordinary general meetings in March and June. The Committee to have power to fix the date and place of meeting." As the rule at present stood, it stated that the annual general meeting should be held on the second Thursday in November; and the ordinary general meetings on the second Thursday in February and May. He understood it had been found necessary to alter the date, especially of the February meetings, on several occasions; and it had been felt that February was a little early in the year for men who were actively engaged in the control of gas-works. The work was too engrossing at the time to admit of their leaving so freely as they could do later on. It was also considered that June was a better month for the summer meeting than May; and therefore this resolution was proposed.

Mr. W. E. Price (Hampton Wick), in seconding, said the proposition to make these changes was adequately discussed in Committee; and it was considered that the times proposed were undoubtedly better than those they had before. Although February was mentioned in the rules, it had been customary to make it later; and last year the first meeting was held on the 1st of March. It was thought best to make the rule conform with the custom.

The motion was carried without further discussion.

The President then delivered the following

Inaugural Address.

When I came to consider seriously at close quarters the most prominent and exacting of the duties that fall more or less heavily upon the President of a technical society—the preparation of his Inaugural Address—I was for the moment appalled at the recollection of my earlier offences in the same line. I remembered—better than anybody else here present—having delivered my soul in this way in 1878, and again in 1897. This is in a sense embarrassing; but after consideration, I have concluded that the members of this Association will be tolerant with me if I "hark back," and recall to-day in the light of what has since happened the chief points in those addresses.

My presidential purview happens to coincide with the advent

into the field of organized artificial lighting of the latest competitor for business—electricity; and I have never had reason to repent of one judgment I formed at the beginning of this Era, and expressed at some length in 1878, respecting the nature of the influence which the rivalry of electric lighting enterprise might be expected to exert upon the professional standing and the pecuniary interest of members of our profession. I laid all possible stress at that now remote epoch upon the increased need for thorough preparation on the part of those young men who had then begun to follow, and hoped to attain success in, the profession of gas engineering. Looking back and around now after 23 years (during which those to whom I spoke have either won the promotion they deserved, or have fallen out of the ranks for one reason or another), the event has justified the forecast. Unquestionably, the men who are most prominent in the ranks of the profession to-day are better instructed men, and more expert in various ways, than many of their predecessors of the last generation. Throughout the country, moreover, in very many relatively retired situations, there are to be found thoroughly well-trained gas engineers, well able to do everything that devolves upon them; and more.

I hold that this elevation of the accomplishment of the average type of British gas engineer and manager is so enormously important and desirable a result, that I must ask you to bear with me if I appear to labour the point a little. There are at least two ways in which a man may follow his calling. He may dislike and despise it, or remain simply indifferent to his higher opportunities in it—thinking only of the emolument he derives from following it, and the enjoyment of the same. On the other hand, he may have his heart in it, keep all contemporary knowledge concerning it at his fingers' ends, and find happiness in improving his practice in the smallest detail, if only he can feel his mastery of his craft growing as he gets older. That is the spirit to help a man through the tight places and over the rough spots in life.

It often occurs to us technicians to be confronted with pressing questions for which we should be able to find an answer, yet to be unable, did our lives depend upon it, to reply on the spur of the moment. This common experience shows the need of keeping our perceptive and judicial powers closely trained up to the standard of the day. It is one of the beneficial incidents of living under the stress of competition, that we dare not limit our attention to our own business affairs. To mind one's own business is, proverbially, the prime condition of success in it. This was one burden of my song in 1878. But minding one's own business involves knowing as profoundly as possible what one's competitors are doing. This is one thing upon which I make bold to say we gas men can give our electrical friends points. Over and over again, when they engage in a favourite amusement of comparing the cost and efficiency of electric lighting with gas, they betray a singular ignorance of what we are able to do for our own consumers. They babble of batswings and other archaic methods of burning gas, which they contrast with the performance of the most ideal of electric lamps, and invite the world to shut its eyes and accept this as a fair method of comparison. I suspect the average gas engineer has a juster appreciation of the reputed 2000-candle arc lamp, or the 16-candle (nominal) incandescent electric lamp, than most electricians would willingly own to possessing of the latest triumph of incandescent gaslight.

It is not alone on the side of the electrical competition that the competent gas engineer is required to have his eyes open. Take as an illustration the recrudescence of an old problem in the shape of the Mond gas project. Without going into the merits of this scheme, I shall perhaps be speaking within bounds in saying that it must have occurred to more than one gas manager to wish he knew a little more about the fundamental truths upon which every proposition of this kind should be judged. A vague belief in the pre-eminent suitability of common coal gas, or carburetted water gas, to be the staple product of a gas undertaking, is scarcely sufficient ground upon which to advance an opinion as to the commercial prospects of a different kind of gas. Such problems are continually being sprung upon us. The question of acetylene is another. It is of no avail for a technician to be confident in his own mind that there is a something wanting somewhere; he should be able to point out what it is, so that anyone can see it. Great is the value of clear exposition. The reverifying of accepted constants is one of the most profitable occupations of men of science in this present age. In so doing, they have detected some startling secrets of Nature. We all need reminding occasionally that the convenient assumptions and conventions that constitute so many of the accepted data on which our practice is founded—which are the technicians' current coin—are only tokens. Every now and again some irreverent sceptic sharply challenges one of them; and then how foolish we feel, although we may look very wise, when we reflect that we have never tested them.

A career sustained under competitive conditions is never a bad one for those who are strong enough to bear the strain. I wish to bring out the truth that existing circumstances have been instrumental in considerably improving the position, and increasing the earnings, of really competent gas engineers. This is a statement which needs making. I have perhaps exceptional facilities for knowing the facts as to the pay and work of gas engineers at home and abroad; and I say with all emphasis that, on the whole, able men are not inadequately recompensed for their services either to gas companies or to municipalities. Very much has been said by myself, as well as by others, of the need that exists for an adequate supply of the right kind of aspirants for gas engineering appointments. For some years past other branches of engineering have proved more attractive to the best class of young men, whom we oldsters would like to see coming to us. The electrical branch, to name the most glaring example, has been choked with learners; while the lack of suitable assistants is not the smallest of the worries of many of our busiest colleagues.

One explanation that has been offered for this unsatisfactory state of things is the alleged poverty of the prospect offered by gas engineering to even talented young fellows. This imputation I am in a position to emphatically deny. We, most of us, could name a large number of men, still young, whose status and income are a sufficient refutation. True, they are deserving men. I can go further, and say that there is room for many more like them. I want this message to go abroad. To my mind, a good deal of this scarcity has arisen on account of the illusion widely disseminated by those who doubtless wished it true, that gas is a dying industry. We know better. But it is not wonderful that such statements, oft repeated, should have an effect upon our recruiting. If two lads of equal promise were now to start fair in the two branches of engineering, I feel assured that he who chose gas would find it the better business. The vogue of electrical enterprise is distinctly beneficial to the able and worthy gas engineer. The two kinds of artificial lighting service are mutually helpful to their *personnel*. It is impossible for the gas engineer to be underpaid while the electrical man in the same town is being well looked after; and *vice versâ*. Of the two callings, it cannot be truly said that the gas service is the worse paid; yet the other is the more sought after, for the time being.

On the thorny subject of the technical education of gas engineering students, I am afraid I can say nothing fresh. Our craft is a speciality; and all competent judges of educational methods agree on this point, if on no other—the specialization must not be attempted too early, and not at all unless the previous grounding has been sound and adequate. For the "After guard" of our gas-works, we want well-educated lads, with the fibre of gentlemen, the sort that has plenty of pluck, is true to his salt, and will not tell a lie.

One more word on this subject; and it is a word with which I do not expect general concurrence. I believe cordially in the necessity to working men of organization. Without it they are powerless, and unable to secure for themselves adequate consideration and share in the profits of industry. But I deplore the hard-and-fast distinction between the parties of Capital and Labour which has been developed to a large extent by Trade Unions. It is to be feared that promotion from the ranks will become scarcer as this spirit grows. The demarcation is of recent origin. It used not to exist; but since militant Trade Unionism asserted itself as the sole guide of the British workman, an insuperable barrier appears to have been interposed between the orders of men enlisted in what is really a common cause. To a Liberal, perhaps, especially it appears unnatural for the barriers of Caste to be erected anew, from one side, after the impediment of Privilege has been abolished from the other sections of the social system. The division is made, too, by those who might be presumed to have everything to gain, and nothing to lose, by the removal of all artificial disabilities to the freest play of native talent.

Another matter that is never very far from my professional heart is the use of gas to the best effect for public lighting. It was my good fortune to be the first to break through the dull, dead monotony of the ordinary system of lighting the street-lamps in London, by applying in the Waterloo Bridge Road the most advanced method of lighting by gas available at the period. This still appears to me to be the correct principle by which gas manufacturers should be guided in their treatment of this branch of their trade. It is their part to take the initiative, and furnish the lighting authority with the opportunity, and the requisite information, for bringing the street-lighting service up to date. We cannot expect local authorities to know as much about the capabilities of gas as we do; and it is therefore our own fault if they remain in the darkness of ignorance. If, notwithstanding all our best-intentioned efforts, the highway authorities continue immoveable—and this is not an unknown experience, I regret to say—the responsibility passes to them. I only wish the general public knew this, because often the local authorities are callous on the point—trusting that the blame for bad lighting will always be heaped upon the gas company, never on themselves.

I know many cities, in many lands; and I am constrained to declare that London, which saw the first Gas Company started nearly a hundred years ago, is at this hour the worst-lit capital city in Europe. To return to London from Vienna, Berlin, Paris, or Brussels, is to pass from light and cheerfulness to dismal darkness and gloom. Yet gas is far cheaper in London than it is in any other capital; and its quality is higher. This condition of things as regards the public lighting of London is a scandal, a reproach, and a danger. It is not that those who should take a pride in having the best of everything for our wonderful Metropolis can plead ignorance of the possibilities of gas lighting. Here and there—in spots—the gas lighting is splendid, the very best in all the world. That is a most remarkable feature of the actual situation. The spectacle presented by the cross streets to the north of Waterloo Bridge is enough to make a Londoner thoroughly ashamed of the authorities whom he entrusts with the care of these historic highways, to which pilgrims from the ends of the earth resort. The London County Council admit that Waterloo Bridge is a magnificent national monument, deserving of the

most reverential treatment; but how have they dealt with the lighting of it? I should be very loth to take my stand there after dark, in company with a friend from the Paris Municipal Administration. It would be too mortifying. On the Surrey side of the bridge, it is true, Mr. Livesey has brought up to the river bank handsome lamp-posts, with shadowless lanterns and incandescent burners, as good as any. On the Middlesex end of the bridge, one may stand and count nine different patterns in lamp-posts, all in sight together; or, peeping over the parapet on to the Victoria Embankment, two or three more. Most of them are bad, ugly, and ineffective. But can a critic plumb the abyss of taste thus opened to his gaze by the deliberate action, or inaction, of the Local Authorities implicated? Is it possible to imagine such a spot in any other European capital so maltreated? That is the point. It is not the details, but the hopeless meanness and vulgarity of the whole, that hurts.

The details of the lighting at this important street intersection will repay attention, they are such a jumble of good and bad. At the crossing itself, and extending to the eastward, the most excellent kind of public lighting known to science—high-pressure incandescent lamps in 1000-candle power units, actual—shows what can be done in the way of facilitating the traffic. This, in short, is adequate street lighting for every purpose, of the boulevard type; although owing to the street alterations in progress, it is not possible to get a proper impression of the full effect which an installation of this order is competent to produce under the best settled conditions, with the aid of clean, light-reflecting frontages. To the southward of the cross-ways, as I have already remarked, all is muddle and artistic depravity. To the northward, all is dark. In this direction, extending for miles, is a region whose aboriginal inhabitants the Gas Company have been powerless to interest in improved street lighting. Along the great thoroughfare of Holborn, the old 5 cubic feet flat-flame street-lamp burners remain in undisturbed possession, as for these thirty years past. These are the highways which electricity marks for its prey; and it is naturally proclaimed a vast improvement. When you get still further north, to the Euston Road, which is in the domain of the St. Pancras Vestry, you will see what central roadway electric lamps can do to put the side-walks into relative darkness.

Westward of the same starting-point, we come also under the fitful beams of the electric arc—sometimes on the kerb line, sometimes in the middle of the road, but always suspended from the most hideous lamp-standards it is possible to imagine in a bad dream. And the "cradles" in which the lamps themselves are hung—would such monstrosities be tolerated anywhere out of London? It is impossible for me to describe them; they must be seen to be credited. Nor is it within the range of my vocabulary fittingly to descant upon the central arc lighting of Regent Street. It is difficult to believe that the Local Authorities can have known what they were doing when they condemned this magnificent thoroughfare to the very worst method of lighting a street they could possibly have chosen. If anyone questions this judgment in respect to a street with sidewalks, let him study this painful example. I suspect that this error was the result of a hasty decision on insufficient information. When these central roadway lights were adopted, no experimental evidence of the nature of the effect to be expected was in existence anywhere. The suggestion may have arisen from contemplation of refuge-lights; but if this was its origin, those who adopted it overlooked the circumstances that roadway refuge-lights were never installed without good sidewalk lights. There is central street lighting in Paris, where these matters seem to be better understood, but it is always combined with side-lamps. It is, in short, refuge lighting pure and simple, necessitated perhaps by the murderous driving of Parisian coachmen. In Berlin, where the nature of the street traffic is different, there are few refuges. Neither in Berlin nor in Paris would such a caricature of lighting as the Regent Street sample be possible. In the design of columns and lanterns, as well as in the quantity of light, we are sadly behind.

I desire to take this opportunity for urging the acceptance by the responsible authorities of a higher standard for the lighting of the streets of London—not only at show-places and the centres of traffic, although that is needed, but also (and especially) in the unornamental, thickly-populated quarters where the poor live. The people have a right to this better service. Think of the proportion of their income spent for lodging, and consider what they get for it. Let the humble streets be brightened; and the result will be something positive done towards that humanizing of the town which is the cause that lies at the back of the plea for the better housing of the people. The gas-lamp has long been called the policeman's best ally; but I wish to put its reputation higher than that. Above the prevention of crime, and the facilitating of the arrest of the criminal, is the cheering influence of good light, and plenty of it, on the moral and social sides of the people's life. I believe that personal smartness, cleanliness of body and surroundings, good temper, and harmless gaity are promoted by ample public lighting; and we want to see English people enjoy more of this boon than has hitherto been vouchsafed to them.

If our climate is sometimes dull and depressing, our gas is cheap and brilliant; wherefore let this English speciality be set off against the other. This can be easily done, if the proper authorities will only rise to the occasion, and put their minds to the work. The means are all ready to hand. To improve the public lighting of any locality that might be named, would only be an affair of a week or two. Local authorities have frequently shown a remarkable twist in this connection. While heedless of the means at their disposal, they have readily increased their public lighting bill three or four fold for the purpose of stringing a few electric lamps sparsely along some chosen main thoroughfare. This is unjust to the mass of ratepayers, who do not live in the favoured spots; and they are further injured by the extravagance of their representatives in that it deprives them of all chance of getting good lighting for the back settlements and main streets which need it most.

The opportunity for a general levelling-up of practice in this respect is now offered for London by the creation of the new Metropolitan Municipal Boroughs. What the small and insignificant Vestries could not, or would not, touch, may be properly undertaken by the Borough Councils. They are beginning their career at a critical juncture of the most highly-developed street-lighting practice, when the electric arc lamp has been found wanting, as well as extravagantly costly, as a street illuminant all over the world. In Berlin (by general consent the best-managed capital city of Europe), arc lamps fail to supersede incandescent gas; the progress is in the other direction. In Paris, also, where municipal administration is practised as a fine art, the increase of the number of incandescent gas-lamps in the streets and splendid open spaces of the noble city is far larger than that of electric lamps. Even in the United States, whence we imported the 2000-candle power arc lamp, the last return of the number of arc lamps in use shows a great diminution during the past five years.

We should do even better in England, because we have the priority in the successful development of the high-pressure system of incandescent lighting for streets, open spaces—in short, for every purpose to which electric arc lamps were once put. This is an improvement upon contemporary Continental practice, for which resumption of the lead in a matter in which we had lost ground I, at least, am heartily thankful. If our local authorities will but do their part, the foreigner will once more take a lesson from us, instead of showing us the way.

As practice is better than precept, on howsoever humble a scale, let me give you an example. My son, who is with me, has arranged to light the sea-front of a southern watering-place with high-pressure incandescent burners. The Gas Company have a small holder that can be spared from the ordinary service. This will be loaded up to give the necessary amount of increased pressure, and connected to supply the promenade lamps direct. Hence there will be no special plant or machinery needed to produce the higher lighting effect; and this town will probably outvie all other towns on that coast. It is unnecessary to explain to you the details of the arrangement. We do not expect to lose more gas by leakage than usual. It may, when in operation, be the first instance of high-pressure street lighting done directly from the works; but if any of you should have a similar scheme in hand, and unmask it sooner, I shall not be jealous.

I am not going to apologize for having engrossed your time on the present occasion with the discussion of some general aspects of public lighting, with particular reference to the case of London. This is the Metropolitan gas engineers' own Technical Society; and if the subject I have brought before you to-day cannot be critically examined here, I know no other platform on which a London gas engineer may deliver his mind upon a matter that has suffered in the past from reticence on the part of those whose professional life is their warranty for discoursing upon it for the behoof of whomsoever it may concern.

In concluding my observations upon this topic, I will say—chiefly for the benefit of any non-technical persons into whose hands the text of this address may come—that in setting such store by public lighting as I have done, my motive is not the narrow commercial one. In English gas undertakings, the public lighting only contributes about 6 per cent. to the total amount of the gas revenue; while it gives them a good deal of trouble and anxiety. It is not, indeed, very profitable in itself. It provides, however, a certain means of advertisement, which is not to be despised. While they do the public lighting at all, gas companies feel a praiseworthy desire to do it in the best possible way. It galls them to be constrained to continue mutely supplying the public lamps with gas to be burnt in the sight of all men in the obsolete fashion, and at the same time to incur odium for it; while they know that a less quantity of gas, used in the best way for producing light, would yield seven or eight times the amount of light and better please everybody. That is the actual position. It is fair to ourselves to place the fact upon record; and I wish we could influence public opinion so as to make it generally understood that gloomy streets are not to be laid to the charge of the gas companies, but can be remedied at short notice, without putting the ratepayers to the exorbitant cost of electric lighting, which, in the majority of instances, is thoroughly unsatisfactory.

The past year has been a trying one to gas companies, chiefly on account of the phenomenal price which it has been necessary to pay for coal. This rise in price has involved, in the case of, I think, the majority of gas undertakings, an increase also in the charge for gas. In the case of companies whose dividends are dependent upon price, and who have paid the full dividend to which they were entitled, the shareholders have had, and will have for a little time longer, to be content with a reduced income. So far as this shows that the sliding-scale is not the one-sided scheme which some have called it, the temporary loss brings some compensation. If we are to gain by reduced cost due to circumstances not wholly controlled by us, it is reasonable that

we should share loss arising in the same manner. I would, however, point out that if gas companies working upon a sliding-scale will be content to divide a portion only of any profit earned above the standard rates, putting the balance into reserve or otherwise accumulating it, then a small increase of price can be met without the disagreeable necessity of lowering dividends. To make myself clear. Suppose a company with a 3s. standard supplying gas at 2s. 6d. per 1000 cubic feet. By the ordinary scale, a dividend of 11¼ per cent. on 10 per cent. capital would be distributable. If the company elect to divide 10½ per cent. only, putting by the remaining 1 per cent., then in time of special need, such as the present, a rise of 4d. per 1000 cubic feet in the price of gas would leave the company still able to pay the same dividend of 10¼ per cent. This is, of course, self-evident; but it is none the less worth mentioning.

Again, upon the sliding-scale. In times like these, there is special danger that its influence may be prejudicial to good management. When giving evidence before Mr. Forster's Committee a quarter-of-a-century ago, I expressed a fear that the principle might introduce something of the spirit of the gambler into the administration of gas undertakings; that in bad times, rather than allow the dividend to be affected, necessary expenditure might be grudged and a fictitious profit thus shown, in the hope that better times coming would enable the wrong to be righted. This anticipation has not been realized in relation to, I think, the vast proportion of the companies to which the sliding-scale has been applied. But, on the other hand, I am quite sure that there are some cases in which, for the reason I have named, the sliding-scale has been not a blessing, but a curse. It is the duty of every engineer to a gas company to insist, so far as he can, that his works and plant shall be maintained in thoroughly efficient order, whether circumstances are favourable or not to the making of large profits.

Reverting to the price of coal, I venture to suggest that there are few problems better worth attention than how best to prevent the recurrence of such an experience as the country has gone through during the past year. Commencing at a time of great manufacturing activity and commercial prosperity, the enormous addition to the cost of coal has had a remarkably rapid but perfectly natural effect. It has checked manufacture and choked industry; and none will mourn to note how soon the blighting effect has been felt by the coal industry itself. It is painful in the extreme to think of the personal suffering which has resulted to millions, directly and indirectly, as the result of this deplorable occasion, and of the demoralization which must have been caused in the mining districts, the effects of which have yet to be seen. I will not venture an opinion as to how the evil, which has taken the dimensions of a national disaster, was brought about. It has caused attention to be again drawn to the danger which must attend the control by a limited number of persons of products necessary to the life of a nation; and I trust public interest in the question may grow in intensity till a remedy is found.

It has been a matter of disappointment to me, and doubtless to many others, that, co-incident with the rise in the price of coal, there has been a large increase in the cost of oil. Carburetted water gas has established its place as an important partner in the business of gas supply. Its economy, efficiency, and general convenience are fully recognized by those—and their number is now large—who have had prolonged experience in its manufacture. Among other incidental advantages, its steadying influence upon the price of coal has appeared to me to be not the least. By introducing another material which can be used in quantities varying with its cheapness relatively to coal, it was natural to expect that some check upon the latter would be established.

I do not say that to some extent this effect may not have been realized in the past winter. If the so-called "coal famine" was not the effect of combination and clever engineering, but was due to a simple failure of the supply to keep pace with the demand, then it may fairly be asked, Would not the price of gas coal have been higher still, if companies had needed to purchase the quantity, considerably exceeding a million tons, which has been released by the adoption of water gas? Be this as it may, we must all regret that oil has failed in the past winter to bring the relief anticipated, and that owners of oil have shown an equal readiness with owners of coal to push to the utmost the advantage which circumstances temporarily afforded them.

One word upon the place which carburetted water gas should take in the economy of a gas undertaking. I have already said that the proportions of the two gases made will vary naturally with the net cost of materials. Apart from this, the quantity made should, in my opinion, be governed chiefly by the fluctuations in demand. There are works in England where no coal-gas retorts have been lighted up or let down through the past five months. The whole of the fluctuation has been supplied by carburetted water gas. The economy of an arrangement of this sort needs no enforcement here. Practically all the plant is kept working under its most economical conditions; and the comfort also of the establishment is enormously increased.

I feel that my apologies are due to the Association for the poverty of this little address. Knowing the difficulty of finding the few quiet hours necessary to its preparation, I should perhaps have acted more kindly had I declined your invitation to take the position of President. The kindness with which that invitation was given, coupled with an earnest desire on my part to do anything of which my friends think me capable, in furtherance of the interests of our profession, and of my many friends, old and young, engaged in it, made a refusal impossible.

I earnestly hope that the Association will always hold its own among kindred societies, helping to a better knowledge of the principles and practice of gas engineering, and cementing friendships among those engaged in it.

[At the conclusion of the section of the address referring to public lighting, the PRESIDENT interposed these remarks: I should like to say that, in my opinion, Berlin is the best lighted city in Europe. It is lighted almost entirely with incandescent gas-lamps; but they are placed at such intervals that the general lighting of the streets is thorough and efficient. There is a certain amount of electric lighting in Berlin; but to my mind, while the volume of light is undoubtedly greater in some of the cases where arc lamps are in use, where it is so the excess light is a superfluity, and the general lighting by means of incandescent gas-burners is ample and sufficient. Working out the figures that I have before me, it would appear that the comparison of cost between the streets lighted by incandescent gas, and those by arc lamps, is in the proportion of 13 to 1 in favour of gas; and in these cases, I have assumed that there are two incandescent burners in each lantern, whereas in many there is only one. I have said I regard Berlin as the best lighted city in Europe; and I regard the Rue de la Paix, in Paris, as the best lighted street in Europe. Those members who know Paris are aware that the Rue de la Paix goes at an acute angle from the Place de l'Opéra, with the Avenue de l'Opéra going straight in front; so that, from the point of junction, one can see down both streets quite well. The Avenue de l'Opéra has practically three rows of electric lights in it—a row down each footpath, and a considerable row down the centre, upon the refuges. The Rue de la Paix has no refuge lamps at all; but only incandescent gas-burners down each side. I think I have looked on that lighting with a fairly impartial mind, and have spoken to a great number of people about it, and have never found an exception to the rule—all pronounce the gas-lighted street as far the more attractive and efficiently illuminated. I find the cost there is in the proportion of 4 to 3 in favour of gas; but it has to be borne in mind that gas is reckoned at the high price of 6s. 9d. per 1000 cubic feet, while the electric light is charged at the cost of generation, which (if I remember rightly) works out to 4·7d. per unit. Again, the incandescent gas-burners used in the lanterns are not what I think are of the most economical character. At any rate, compared with the cost in London, the comparison would be as about 8 to 1 in favour of gas lighting.]

At the close of the address, the President resumed his seat amid applause.

Mr. W. D. CHILD (Romford) said it was his pleasing duty to propose a vote of thanks to the President for his excellent address. In connection with this, he might say that, in honouring the Association by undertaking the duties of the chair, and in devoting his valuable time to their affairs, Mr. Woodall had performed another of those kindly actions which they had learnt to associate with his name. They had felt sure that any subjects dealt with by the President in his address would be handled in a manner which would be interesting and helpful. Respecting the remarks made on public lighting, and which would apply not only to London but to other towns, it was to be hoped they would come before the notice of those who controlled the public lighting; and in this way they could not fail to be of assistance to every member of the Association.

Mr. S. W. DURKIN (Southampton) seconded the motion; remarking that the magnetic influence of Mr. Woodall had given them a very good attendance, and it seemed to him (Mr. Durkin) this had given to the Association a fresh start. Under the Presidency of Mr. Woodall, they would look forward with confidence to a furthering of the work of the Association.

The motion was heartily carried.

The PRESIDENT said he was much obliged for the cordial way in which the members had received the proposal. It was only one more of the evidences (of which he had had very many) of the kindly way in which gas men treated one another. With regard to the remainder of his year of office, he could only promise that he would do all in his power to help the meetings, so as to make them as interesting and profitable as possible; and he was quite sure that the Committee and the members would, both in the interests of the Association as well as out of friendly kindness towards their President, do their utmost to support him.

This ended the business part of the proceedings.

The annual dinner engaged the evening. It was well attended; and among the guests was Mr. James Mansergh, the President of the Institution of Civil Engineers. Altogether a very happy time was spent by those privileged to share in the event.

NEW ENGLAND ASSOCIATION OF GAS ENGINEERS.

The Thirty-first Annual Meeting of this Association was held at Boston on Feb. 19 and 20, under the guidance of the President, Mr. WALTER R. ADDICKS, of Boston. There was a full attendance of members; and the report revealed a flourishing state of

affairs. Twelve active and twenty Associate members were elected; and a Committee of five was appointed by the President to introduce the new members to those of older standing.

The President delivered an Inaugural Address, in which he spoke favourably of the policy of joining the supply of gas and of electricity under one management. Referring to the list of papers to be submitted to the meeting, he said that every endeavour had been made to ascertain what subjects were particularly interesting to the members at present, and to satisfy the want. So the programme included papers on inclined retorts and coke-ovens, all well up to date. He passed on to notice the self-intensifying gas-lamp, which had been the subject of a large number of experiments under his direction, the results of which were most encouraging. With a pressure of 8 inches of water, it was possible to obtain, from ordinary 16-candle gas, a duty of 32 candles per cubic foot; so it was by no means impossible that the problem of modern gas lighting might be solved by mantles and a high-pressure system. One of the advantages would be a reduction in the first cost of piping a house, as smaller pipes than those required at present could be used. Attention was next directed to the gas-engine in connection with electric lighting, which had also been the subject of some experiments. These showed that over 30 kilowatts could be obtained by the combustion of 1000 cubic feet of gas; and taking the cost of gas at 4s. 2d., this represented 1·6d. per kilowatt. The lowest price at which current was sold by the electric light companies was 4d. per kilowatt. It was possible to get almost perfect regulation, even with large variations in power; and the importance of direct-driving—the engine and dynamo being both on one shaft—was insisted on. The President directed attention to the desirability of having the whole of the proceedings of the Association from the commencement put into book form; and at some length discussed how this might be done.

Mr. S. J. Fowler, of Springfield (Mass.), read a paper on "Purification." The situation of his works, near the centre of the city, rendered it very desirable to avoid offensive odours as much as possible. Up to October, 1895, four purifiers, each 10 feet by 16 feet by 3 feet deep, were used, charged with lime only. At that date they were replaced with five others, each 20 feet by 32 feet by 3½ feet deep, the charge for each of which was about 1000 bushels of iron mass, containing 15 lbs. of cast-iron borings to the bushel of sawdust. During the five years ended Oct. 31, 1895, 500 million cubic feet of gas were purified at a cost for material and labour of about £5 per million. Up to July 1 last, 653 million cubic feet had been passed through the new boxes; and the cost for material and labour was only 13s. per million. But as the first 5000 bushels of mass accumulated sulphur, and the make increased, it was necessary to have more frequent changes; and there was some complaint of nuisance. This led him to try the use of air; and he arranged a small pressure blower driven from the countershaft of the exhauster. The air passed through a wet meter and seal-box, and was admitted at a point near the hydraulic main, where the temperature of the gas was about 120°. The gas was not thoroughly cooled, but passed through the purifying apparatus at about 80°. At the middle of March, 1900, he commenced to inject about 1½ per cent. of air; and from this date up to Jan. 1, he had only changed purifiers five times. The purifiers were charged with one shallow bottom layer about 4 inches thick, above which was a layer a little over 2 feet thick. When starting the new purifiers, the first and second boxes were charged with material that had been used twice and passed about 16 million cubic feet; the thin bottom layer consisting of sawdust only, and being intended to remove tarry matter. The third and fifth boxes were filled with new material, and the fourth with some used material that had passed about 12 million cubic feet of gas. The thin layers in the third and fourth boxes consisted of very old iron mass, instead of fresh sawdust. Starting on March 15, there was no change until July 26; and over 51 million cubic feet were passed. The others followed on Sept. 22, Nov. 27, Dec. 8, and Dec. 21, respectively. There was some trouble with heating, which necessitated stopping the air for a day or two, and with back-pressure. The first three changes were on account of back-pressure; while the last two, following so quickly, were caused by the sluggishness of the new oxide, which had not got into condition. The oxide that had been in action for some months was so hard that it had to be broken up with pickaxes, and pounded to pieces on the revivifying floor; and it was also charged with tar in places. The net result of the ten months' work was the purification of 127 million cubic feet of gas, or over 25 millions per change; whereas, before using air, the usual quantity was 8 million cubic feet per change. The amount of air used was 1½ million cubic feet, or about 1·2 per cent. Just at the time that he commenced the use of air, the question of the reduction of the price of gas at Springfield was before the Board of Gas and Electric Light Commissioners; and one of the points made by the petitioners was that a blower was surreptitiously used and 20 per cent. of air added to the gas.

Discussion being invited, Mr. Norris asked if the author was able to keep up a regular and constant supply of air with the arrangement described. He had used a similar arrangement, and found that it was affected by the variations in speed of the shaft. He was considering the advisability of using a piston pump instead. He also had trouble from the rusting of the drum of the wet meter. Mr. F. C. Sherman remarked that the slower the gas passed through the boxes the better; and that therefore the large size of the new boxes had contributed to some extent to the very excellent results. Those who had not such large boxes in proportion to their make of gas could not expect to get such good results by adopting the use of air. Captain M'Kay congratulated the author on the progress reported by him in reducing the cost of oxygen; and Mr. Walton Clark said that the use of small proportions of air in the manner indicated was beneficial to the company and consumer alike. It resulted in better quality, less nuisance in the neighbourhood of the works, and reduced costs. Mr. Fowler, in replying, said that his make of gas was somewhat irregular. It averaged under 30,000 cubic feet per hour; but the maximum, when he was making water gas, might be 45,000 cubic feet. He certainly did not exceed 25 per cent. of water gas. He found some difficulty in keeping a perfectly even supply of air, as the blower had a large clearance, and therefore required to be run at a fairly high speed.

Mr. Carroll Miller, of Newark, N.J., described some experiments made with the object of determining the proportion of sulphuretted hydrogen removed in each box of a set of four purifiers. Tests were made daily, in the coal-gas purifying-house, over two months, at the inlet to the first and at the outlets of all the purifiers; using the iodine and starch process. The vessels were 24 feet by 30 feet, with one layer of oxide 30 inches thick in each, and having steam coils in the bottom to maintain an even temperature. Throughout the tests, the temperature was kept practically constant—at 84° in the first, 78° in the second, 70° in the third, and 64° in the last; and no air was admitted with the gas. The quantity of sulphuretted hydrogen at the inlet of the first box ranged from 420 to 670 grains per 100 cubic feet of gas. The method of working is to run all four boxes, except when one is off for changing. A change is made a day or two after the third box shows a foul test. The average of the tests showed 44·6 per cent. removed in the first, 44·2 per cent. in the second, 10·4 per cent. in the third, and 0·8 per cent. in the fourth. The first box on being turned into use commenced by removing some 80 per cent., and was still removing about 18 per cent. when the next change became necessary. In one case only was it found that the first box was absolutely useless when turned off. Some tests were also made on the purifiers used for water gas, which were also four in number, size 30 by 36 feet, one layer of oxide 30 inches thick in each box, and heated by steam coils to a fairly even temperature of 75° in the first, 69° in the second, 65° in the third, and 62° in the fourth box; and no air was admitted with the gas. The sulphuretted hydrogen at the inlet of the first purifier ranged from 180 to 235 grains per 100 cubic feet of gas; and the first box immediately after a change removed 70 per cent., gradually falling to 4·5 per cent. at the time of the next change. No. 2 took out 51 per cent.; No. 3, 11 per cent.; and No. 4, 2 per cent. From these results, the author argued that there was a considerable advantage in running all four boxes, except the intervals for changing, as compared with the plan advocated by some, of three on and one off.

Mr. Norris opened the discussion by remarking that the paper was a powerful argument in favour of the four-box system. The first box was not turned off until it had nearly ceased to absorb sulphur; whereas, with the three-box system, as usually operated, when the second box showed a foul test, and change was necessitated, the first would be doing about 50 per cent. of the work. Lately there had been a movement in favour of two boxes only; and the process described by Mr. Miller afforded a means of testing the gas right through from the condenser and finding out how much sulphuretted hydrogen was taken out in each vessel. Mr. Nettleton was glad to hear of an improvement on the crude test afforded by lead paper, and would like to know something about the expense of the apparatus, and the time required to take a test. Mr. Ramsdell remarked that the work to be done in the purifiers was largely influenced by the previous treatment in the washers and scrubbers; and it all turned on the proportion of sulphuretted hydrogen present at the inlet to the first purifier. Mr. Miller, in replying, said that the iodine test was not suitable for applying to the last box of the series, because there might be an error to the extent of 15 grains; otherwise it was a valuable test of the actual work that was being done. The apparatus was not expensive; and the whole four tests never took more than an hour. The apparatus was contained in a portable case; and all the work was done in the purifying-house.

Mr. Walter S. Allen read a paper descriptive of the gas lighting at last year's Paris Exhibition. He said that while there was comparatively little that was novel, the illumination of the Exhibition, as shown by gas and electric light, made it clear that, when gas is properly used, there remains a large field in which, by reason of its cheapness, it need not fear electricity. The experience of the city of Paris in lighting its streets and open spaces showed that gas was quite as cheap, and the light better distributed, by Welsbach burners than by arc lights; and no one would question the superiority of the Welsbach over incandescent electric lamps. He also remarked that the gasmen in the United States did not realize in any degree the possibility of using gas for illuminations on all occasions of public festivity. In Paris, every kitchen was equipped with a gas-stove as well as a coal-stove; but not many gas heating stoves were to be seen. Yet ordinary coal rarely came down to £3 5s. per ton, and last year had been over £4. The Paris Gas Company put a stove, meter, and some fittings free of charge into small houses, letting at £20 a year or less,

(To be continued.)

BOSTON (U.S.A.) COKE-OVEN GAS PLANT.

(*Continued from p.* 682.)

Condensing-House.

The condensing-house is a steel structure filled with red brick, 270 feet long and 80 feet wide. The entire quantity of gas treated is 20 million cubic feet per 24 hours, of which one-half is rich and the other poor gas.

The general arrangement of the plant is shown in figs. 12 to 17. The gas enters through two mains, A (for the rich fraction) and B (for the poor fraction). All the tar which has collected in the mains is intercepted in the tar-wells C and C^1, and pumped from there to the tar storage tanks K, fig. 2 (*ante*, p. 616). These tanks have a capacity of 19,000 barrels each; and from them the tar is supplied to the tar distillation works of the National Coal-Tar Company, whose distilling plant is now in course of construction on property L, fig. 2, leased to them by the New England Gas and Coke Company.

As will be seen from fig. 12, the apparatus in the condensing-house is arranged in five sets, of which three sets are intended for the rich gas and two sets for the poor gas. In the gas-main a gate-valve D is provided, which connects or disconnects the two parts of the condensing-house. At present, only the double set of apparatus is finished, and in operation; while the triple set is almost completed, and will be connected in a short time.

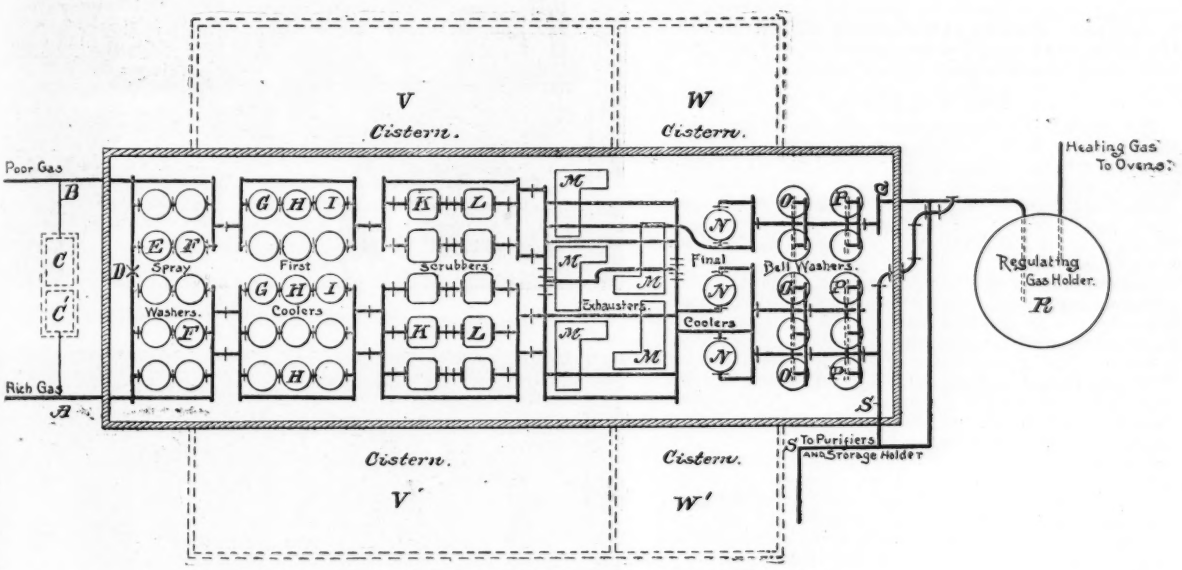

Fig. 12.—General Plan of Condensing Plant.

The treatment of the gas in the different apparatus is as follows: It passes through the spray-washers E, F, in which it is cooled by means of sprays which at the same time are very effective in separating tar. From these it enters into the multitubular coolers G, H, I. These are of the usual construction. The gas passes through the apparatus in the direction of G, H, I, around tubes through which cold water is flowing. This water enters into the apparatus I and travels in the opposite direction, I, H, G—leaving G in a hot condition, so that it can be used to advantage in the boilers.

The gas issuing from the coolers has a temperature of about 75° Fahr., and is next conducted through the tar scrubbers K, L. From these it is drawn by the exhausters M, which have so far moved the gas by suction. They then force the gas through the rest of the plant under pressure. By the compression, the temperature of the gas is slightly increased; and, in order to obtain the best results in regard to recovering the ammonia, the temperature is again lowered, by means of the final coolers N, to the standard temperature of 75° Fahr. The gas finally passes through bell washers O, P, which remove the last traces of ammonia.

The poor gas which has passed through the double set of apparatus will then go through the pipe Q into the small gas-holder R. This holder is nothing but a pressure governor, and holds only about 50,000 cubic feet. From here, the gas is sent to the different batteries for heating the same.

The rich gas which has been treated in the triple set of apparatus then passes through the pipe S to the purifying-house, and to the city. The system is, however, arranged so that the use of the two sets of apparatus may be reversed—namely, that the rich gas may pass through the double set of apparatus, and the poor gas through the triple set.

All the products of condensation and scrubbing are collected in two double underground cisterns, V, W and V^1, W^1. Such arrangements are made that clear water is used in the last set of bell washers P, and that the weak liquor thus produced is used over again in the other bell washer set O, and then in the tar scrubber set K, L, &c. In other words, it passes in counter-current to the gas; and its percentage of ammonia is gradually increased, so that a comparatively strong liquor is collected in the large cisterns V, V^1, from which it is then pumped into the ammonia factory for distillation.

The use of wood has been reduced to a minimum in this building, in order to make it as fire-proof as possible. The operating floor consists of iron grates, which have also other advantages—viz., they reduce the expense for keeping the floor clean, and at the same time permit the inspection of the entire pipe-cellar without going below. Plunger pumps are located in the cellar which are handling the liquor and tar from the different cisterns and to the different apparatus, &c.

A number of testing appliances are provided for the control of temperatures and pressures, the percentage of bye-products in the gas, &c.; but it would take up too much space to describe all these in detail.

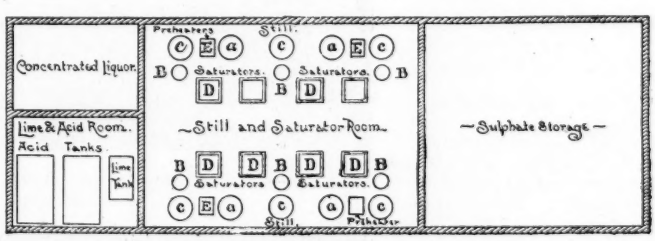

Fig. 13.—General Plan of Ammonia Plant.

Ammonia Plant.

The size of the building is 210 feet by 70 feet. The strong-gas liquor which has been collected in the cisterns V and V^1 (fig. 12), is pumped into an overhead tank in the condensing-house, from which it runs by gravity to the ammonia plant, fig. 13.

The gas liquor contains the ammonia in the form of many different compounds which can partly be expelled by steam (volatile ammonia). This is chiefly carbonate and sulphide of ammonia. Another part (the smaller percentage) is in a fixed form. It consists chiefly of chloride, sulphate, sulphocyanide of ammonia, &c. These salts must be decomposed by the addition of milk of lime, which combines with the acids and sets the ammonia free.

The gas liquor is accordingly passed first through the volatile ammonia stills A; then through the lime-mixers B; and finally through the fixed ammonia stills C. The spent liquor, which contains considerable lime compounds, is then passed through preheaters E, for the fresh liquor, in which it transfers its heat to the latter before entering the stills C. The spent liquor, which contains considerable lime compounds, is then passed through preheaters E, for the fresh liquor, in which it transfers its heat to the latter before entering the stills. It is subsequently carried outside to sedimentation tanks, where all the lime is retained and can be utilized. The remaining clear liquid is then allowed to run off.

It is furthermore seen that for each two volatile ammonia stills A, three fixed ammonia sets B, C are provided. Thus, one fixed ammonia set is always in reserve, in case one of the other sets should become clogged by lime and require cleaning.

The steam used for the distillation is allowed to enter at the bottom of the fixed ammonia still C. From the top of this, it passes through the lime-mixer B, and then enters at the bottom

of the volatile ammonia still A. On its way it carries along the ammonia vapours and finally, from the top of the volatile ammonia stills, a mixture of steam, ammonia, carbonic acid, and a small percentage of sulphuretted hydrogen, &c., escapes. This is then passed under boxes open at the bottom, which are suspended in a sulphuric acid bath in the saturating boxes D. The gases are forced through the sulphuric acid, which retains only the ammonia. All the other obnoxious gases are carried to the large boiler-stack. Provisions are, however, made to utilize them in case this can be done profitably.

The ammonia gradually neutralizes the sulphuric acid in the saturating boxes D which are lined with heavy lead. When this neutralizing process is complete, the sulphate of ammonia separates in the form of white crystals. The entire contents of the box are then run by gravity into a large lead-lined tank, from which the mother liquor may be drained off. The sulphate is finally placed into centrifugal driers, which remove the last traces of mother liquor. The salt is then ready for bagging. A large lead-lined store-house is provided for the sulphate, which is sold under a guarantee of 25 per cent. ammonia.

The plan, fig. 13, shows provisions for storing and slaking lime, for storing sulphuric acid and mother liquor, and also a reserve in space for a concentrated liquor plant. The entire plant is designed with the view of reducing the labour cost to a minimum, and can produce 30 net tons of sulphate per 24 hours.

Purifying Plant.

The gas leaving the condensing-house through the pipe S, fig. 12, is freed of tar and ammonia. It is then transferred to the Massachusetts Pipe-Line Gas Company, who are the distributing agents. The purification is done in the works of the latter Company, which are, however, situated on the same property with the New England Gas and Coke Company's works (see General Plan, fig. 2).

As the gas to be sold is produced during the first half of the coking period, while the temperature of the coal is low, it is to be expected that this rich gas is lower in so-called organic sulphur, and higher in sulphuretted hydrogen, than the second or poor gas. This is of very great importance, as it considerably simplifies the purifying process. In case the percentage of organic sulphur should be so high as to go beyond the limits fixed by the State law, it would become necessary to extract it. To accomplish this, the removal of the carbonic acid by lime would be unavoidable. Every gas man knows the expense and trouble connected with lime purifiers. This will be entirely avoided in our case. As the process stands now, the sulphuretted hydrogen alone will be removed; but this will be done completely.

The carbonic acid will remain in the gas. This will only tend to reduce the candle power. But means have been devised to enrich the gas very cheaply; and it will be more economical to bring up the candle power than to remove the carbonic acid. The organic sulphur will also remain in the gas. Its percentage will not exceed the figure fixed by State law.

The plant, as it is designed now, consists of six boxes of the Beal type, each containing two layers of oxide; and the gas passes through them in the well-known manner. The oxide is a Canadian bog ore, which will be used with as small a percentage of shavings as possible. Provisions are made to recover the sulphur from this oxide.

Gas Storage and Meter-House.

The purified gas will then go to a large holder of a capacity of 5 million cubic feet. The holder has four lifts, and its diameter is 198 feet. From the holder the gas passes through the meter-house, and then through two 42-inch pipes to the several gas-works which the Massachusetts Pipe-Line Gas Company intend to supply.

Power, Light, and Water Plant.

The power is supplied by a central electric station, fig. 19. This consists of two 500-kilowatt generators. The engines have been built by the Pennsylvania Iron-Works Company, and the generators by Siemens and Halske. The steam is supplied by a set of eight 250-horse power Babcock-Wilcox boilers, which are arranged to use either coal, coke, breeze, or gas (fig. 18). The water supply is derived from a number of wells which are driven around a small hill on the Company's property. Two standpipes, 120 feet high and 10 feet diameter, are provided. One of them is also connected with a salt-water pump, so that in case of emergency salt water can be used.

There is a fully equipped machine-shop in operation, which has done effective work during the construction of the plant; and last, but not least, the laboratory should be mentioned, with its very complete equipment.

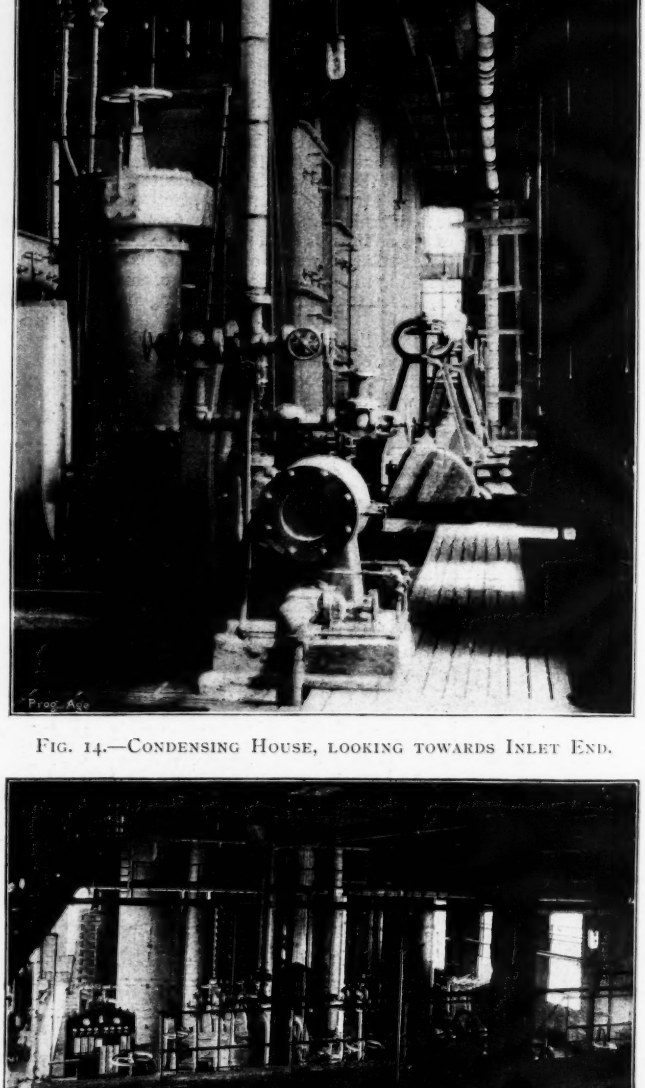

Fig. 14.—Condensing House, looking towards Inlet End.

Fig. 15.—Condensing House, looking from Top of Scrubbers towards Exit End.

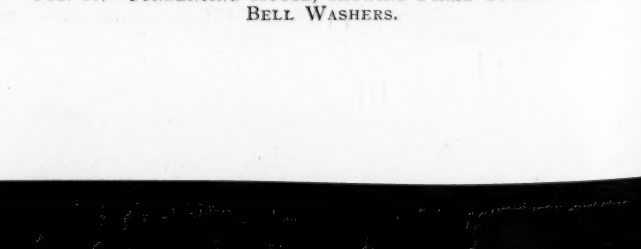

Fig. 16.—Condensing House, showing Final Coolers and Bell Washers.

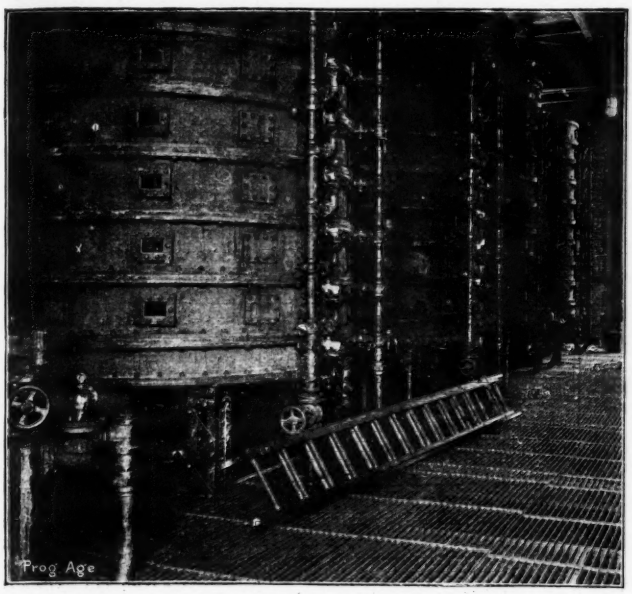

FIG. 17.—BELL WASHERS IN CONDENSING HOUSE.

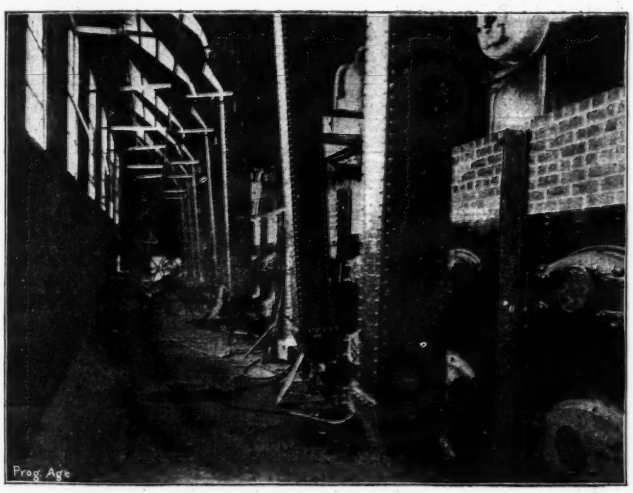

FIG. 18.—BOILER HOUSE.

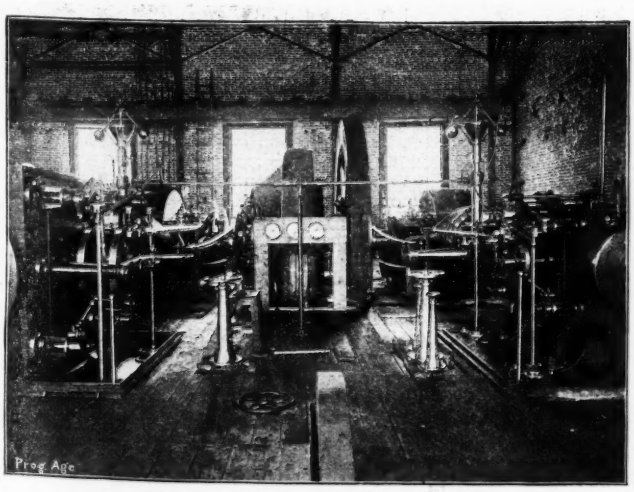

FIG. 19.—POWER PLANT.

RAW MATERIAL USED.

Coal.—The coal is washed slack coal (*i.e.*, coal smaller than 1 inch) from the Cape Breton mines of the Dominion Coal Company. The coal enters the United States at the low rate of duty for slack—viz., 15 c. per 2240 lbs. On all export coke manufactured from this coal, a drawback is allowed by the United States Customs.

The coal from the International seam has been extensively investigated by the writer at Glassport, Pa.; and a short account of the results has been given in Professor Hofman's extract from the report. We refer to this paper, and will repeat here only the following data:—

Ultimate Analysis of the Dry Coal.

	Per Cent.
C	75·10
H	3·75
N	1·51
O + S	13·80
Ash	5·84
	100·00

Crucible Test of the Dry Coal.

	Per Cent.
Volatile matter	34·60
Fixed carbon	59·56
Ash	5·84
	100·00

The calorific value, according to Dulong-Mahler's formula, is 12,437 B.T.U. The coal is of excellent coking quality, besides giving a high gas yield. This is not usually the case with other good coking coals. The various distillation tests gave the following average results:—

Products from 1 Long Ton of Coal.	Pounds.	Per Cent.
Coke, total—		
Large, >1 in., 66·99 per cent.		
Small, ½–1 in., 1·64 ,,	1,593·4	71·13
Breeze, <½ in., 2·80 ,,		
Tar	75·7	3·38
Ammonia (= 1·373 per cent. sulphate)	7·6	0·34
Gas, total, 10,390 c. ft., of ·466 sp. gr.	368·0	16·43
Sulphur compounds in gas—		
Hyd. sulphide (H_2S), 0·98 lb. per 1000 c. ft.	10·8	0·48
Carbon disulphide (CS_2), 0·13 lb. per 1000 c. ft.	1·6	0·07
Gas liquor and loss, by difference	182·9	8·17
Total	2,240·0	100·00

It has been stated above that the weight of the charge is 6 net tons with a coking time of 24 to 30 hours. Thus the capacity of the 400 ovens is from 2000 to 2400 net tons of coal per 24 hours.

Purifying Material.—A bog ore from Three Rivers, Quebec, Canada, will be used, guaranteed to contain 65 per cent. of ferric oxide, and not more than 25 per cent. of moisture. This oxide was selected after an investigation of a great number of materials from different sources. It may be mentioned that several European bog ores came in very close competition with this Canadian oxide. It was found that the European ore could be laid down almost as cheap as the Canadian ore; and it is well worth while to call the attention of gas engineers to this fact.

Sulphuric Acid.—This will be chamber acid of 50° Beaumé; and a contract for the entire supply has been made with a Boston firm. It has been suggested that the sulphur in the spent oxide may be used for the manufacture of this acid; but as this would require the erection of an acid-works, the matter has been postponed.

Lime.—It will be remembered that lime is used to some extent in the ammonia-house for decomposing the fixed ammonia compounds of the gas liquor. The same can be obtained from several sources along the Atlantic coast, where lime in great quantity, and of excellent quality, is found.

PRODUCTS OF THE PLANT.

Coke.—The coke made in the Otto-Hoffmann ovens varies in its physical character according to the temperature and the coking time. If a very soft coke is desired, which is more advantageous for domestic purposes, then the ovens are kept at low temperatures, and pushed just as soon as the bulk of the gas has been driven off.

Coke for Metallurgical Purposes.—If, on the other hand, a high-grade fuel for metallurgical purposes is desired, then the ovens are operated at high temperatures, and the coking is continued until the last traces of volatile matter have been driven off.

The question may be asked, whether the coke produced at Everett is at all suitable for metallurgical purposes; and this may be answered decidedly in the affirmative.

The Cape Breton coal is now extensively shipped to the blast-furnace of the Nova Scotia Steel Company, at Ferrona, N.S., where it is coked in retort coke-ovens. The coal is first washed, on account of its high percentage of sulphur; and the result is that the coke contains, according to the blast-furnace manager's statement, only 1·08 per cent. of sulphur and 8·20 per cent. of ash. It may furthermore be stated that our own investigations show that the phosphorus is extremely low—namely, 0·0041 per cent. It is, however, doubtful whether the percentage of sulphur will be maintained as low as the one given above.

It may be mentioned here, that processes have been developed of late which practically remove the sulphur from the pig iron. These are the well-known methods introduced in England by Saniter, and in Germany by Hilgenstock. By their adoption, coke with up to 2 per cent. of sulphur may be used.

It is not improbable that the cheapness of coke, as now produced at Everett, may revive the once flourishing iron industry in the New England States. Iron ore is found in abundance in Cuba and Newfoundland, and limestone is also plentiful along the Atlantic coast. The large plant of the Dominion Iron and Steel Company, now in course of erection at Sidney, N.S., is founded upon the same raw materials as are available at Everett.

The great advantage of the retort coke-oven, as compared with the ordinary gas-house retort, is the possibility of thus making a high-grade metallurgical fuel. Everybody knows what trouble has been experienced in disposing of the gas-house coke. Its use is practically limited to domestic purposes; while the coke from the retort coke-ovens finds a very much greater sphere of usefulness. Besides the iron industry, the coke is of most excellent quality for other metallurgical purposes, as copper, silver, and lead smelting, &c. Already a 50,000-ton order for export has been received; and other shipments have been made to Canadian smelters. This easily demonstrates the great possibilities for the Everett coke; and there is no doubt that all other large cities along the Atlantic coast which are now making gas by the ordinary gas-retort or by water-gas process, offer similar good chances for the use of Otto-Hoffmann ovens, on account of the large market for coke within their reach.

Coke for Boiler Purposes.—The coke has given great satisfaction under both stationary boilers and locomotives. It has been extensively tried by the Boston and Maine Railroad, and has been found so satisfactory that now the number of locomotives using it is steadily increasing. It is clear that the use of coke removes the objectionable smoke by which travellers have been annoyed heretofore. The efficiency is greater than that of soft coal. The same has been found with stationary boilers. Soft coal clogs the flues constantly, and necessitates frequent cleaning. This is an expense as well of labour as of fuel, as it prevents the full utilization of heat. Absolutely no dust or soot accumulates in the boiler-flues when coke is used.

Coke for Domestic Purposes.—The advantages of coke over soft coal are still more apparent in its use for domestic purposes; and the absence of smoke and soot readily accounts for the increasing use of the Otto coke at Boston as well as at Pittsburgh, Cleveland, and Chicago, which latter cities are supplied by the Otto-Hoffmann plant of the Pittsburgh Gas and Coke Company, at Otto, Pa.

There is no doubt that this coke in districts in which cheap bituminous coal is available, will displace anthracite. Its porosity gives it a great advantage over the dense anthracite, inasmuch as it facilitates the starting of the fire. It also gives a hotter fire, requires less draught, and is more easily and promptly regulated than an anthracite fire. As compared with soft coal, the following advantages of the coke are apparent: It is hard and clean, and makes no dust; while the soft coal is friable, and makes a great deal of fine dust in the house. Coke makes neither smoke nor soot. Coke does not deteriorate when stored; nor does it ignite spontaneously, as soft coals are liable to do.

A part of the coke production is broken in crushers and screened to three sizes: Egg coke, which is suitable for small boilers, laundries, large and medium house furnaces, smelting and refining of metals, large forges, &c.; nut coke, which is suitable for small house furnaces, kitchen ranges, medium size forges, and crucible furnaces, &c.; pea coke, which is suitable for small forges and ordinary blacksmith purposes, cement works, &c.

The yield of coke is about 73 per cent., which makes a total daily output of from 1460 to 1750 net tons for the 400 ovens.

Tar.—The tar which has been obtained so far has not been subjected to any distillation test. But, as stated above, extensive experiments with the coal were made at Glassport; and the tar obtained was carefully investigated. The table at the top of the next column gives the results of this test, and at the same time compares it with several other tar brands.

The softening point of the pitch was found to be 87° C., and its specific-gravity 1·350. The yield is about 5 per cent., which would make a total daily production of from 100 to 120 net tons when running in full. The entire tar is sold to the National Coal Tar Company, who are now erecting a distillation plant on property leased from the New England Gas and Coke Company. The Company propose to manufacture roofing paper and other products from this tar.

Ammonia Products.—It is proposed to make chiefly sulphate of ammonia; but provisions are also made to manufacture any other ammonia compound, the market conditions of which make this desirable. The sulphate of ammonia is guaranteed to contain 25 per cent. of ammonia. The test showed a yield of 1·373 per cent. sulphate = 27·5 lbs. per net ton of coal used. Assuming a yield of only 25 lbs. per net ton, the daily production would be from 25 to 30 net tons. The present market price of sulphate of ammonia, f.o.b. New York, is $63 per net ton.

Fractionate Distillation of Various Tars.

Fraction.	Temperature. Deg. C.	International Coal Seam; Otto-Hoffmann Oven; Weight p. c.	German Otto-Hoffmann Oven Tar from Germania Plant; Weight p. c.	Average German Gas-House Tar; Weight p. c.	
				(1)	(2)
Oil—					
Light	80—170	3·7	6·55	3·0	2·5
Middle	170—230	9·8	10·54	7·5	2·5
Heavy	230—270	12·0	7·62	33·5	25·0
Anthracene	over 270	4·3 } 71·3	44·35 } 74·9*	10·5 } 56	10·0 } 70
Pitch	..	67·0 }	30·55 }	45·5 }	60·0 }
Water	..	2·3	trace	..	..
Loss	..	0·9	0·39	..	..
		100·0	100·00	100·0	100·0
Sp. gr.	..	1·170	1·1198	1·155	1·155

* Distillation was carried on until nothing more was driven off. The softening point of the remaining pitch was 165° C., against 87° C. with the International pitch.

Surplus Gas.—No analysis or photometric test of the gas, as it is now actually produced at Everett, has been made, but the results of the writer's investigations show that the rich and poor gas, made from coal from the International seam, will have about the following composition and properties:—

Composition of Gas.

—	Rich Gas, Surplus. Volume per Cent.	Poor Gas, Used for Heating Ovens. Volume per Cent.
Olefines ($C_m H_n$)	5·2	2·4
Marsh gas (CH_4)	38·7	29·2
Hydrogen (H_2)	38·4	50·5
Carbon monoxide (CO)	6·1	6·3
,, dioxide (CO_2)	3·6	2·2
Oxygen (O_2)	0·3	0·3
Nitrogen (N_2)	7·7	9·1
	100·0	100·0
Calorific value: B.T.U. per cubic foot	685·8	566·7
Average candle power	14·7	9·0
Specific gravity	0·512	0·421

Yield of Gas per Long Ton of Coal.

—	Cubic Feet.	Per Cent.
Rich gas, surplus	5,143	49·5
Poor gas, for heating ovens	5,247	50·5
Total	10,390	100·0

Distribution of Heat in Gas.

—	Volume of Gas, Cubic Feet.	B.T.U. per Cubic Foot.	Total B.T.U. in Gas.	Percentage of Total Heat Value.
Rich gas	51·43	685·8	3,527,320	54·2
Poor gas	52·47	566·7	2,973,680	45·8
	103·90	626·0	6,501,000	100·0

From these figures, it is evident that the coal can be coked with less than one-half of the total heat-value of the gas produced. It would carry us too far if we were to enter into all the details regarding the gas. It should be stated, however, that the coal which was used in these tests had been exposed to the weather for four to five months. In fresh coal, the candle power of the gas, as well as its calorific value, is even higher than the figure given above. Furthermore, the plant at Glassport at which the tests were made, is not specially operated for gas, and consequently the nitrogen in the gas is higher than we expect to obtain at Everett, where all the care possible is taken to keep the percentage of impurities in the gas at a minimum.

A remarkable feature is the high percentage of carbonic acid in the gas at the beginning. The weathering of the coal has something to do with this, as it is a process of slow oxidation, during which the percentage of oxygen in the coal is considerably increased, which then appears as carbonic acid, in the products of distillation. With the fresh coal, the percentage of the carbonic acid is considerably lower, the result of which is a higher candle power and calorific value of the gas. The question of purifying has already been discussed.

One important feature should be mentioned. The rich gas to be used for distribution in the city is produced during the first half of the coking process, during which the temperature in the retort is comparatively low. The obtrusive friend of the gas man,

naphthalene, has not put in its appearance as yet during this period, or rather the percentage of hydrocarbons lighter than naphthalene—namely, benzol, toluol, xylol, &c.—is much in excess of that of naphthalene, and the latter cannot deposit in the pipe system. The great advantage of this feature will be apparent. The naphthalene is produced chiefly during the second period of the distillation process; and thus it will almost entirely be retained in the gas-works proper, where provisions have been made to readily overcome any troubles arising from it.

Other Bye-Products.

The recovery of other bye-products—such as cyanides, sulphur, benzol, &c.—has all been taken into consideration when designing the plant; but it was deemed advisable to postpone any additions for the purpose of recovering these bye-products until the plant would be in full operation. This would give us a better chance to determine the advisability of equipping for their utilization.

(To be continued.)

NEW HOT-COKE CONVEYING PLANT AT THE LEEDS GAS-WORKS.

During the past year or two, gas engineers have given more serious consideration to the question of handling the hot-coke direct from the retorts, quenching it, and delivering it to the coke-yard. Every credit must be given to those engineers who experimented with this problem, and who have really laid the foundation whereby a successful coke plant can now be made and erected. Such names, for instance, as Hack and Hunt are household words when the subject of conveying hot or cold coke is mentioned, as the early experience gained by them and given to the gas profession has, and will be, of the greatest value.

Almost every known style of conveyor has been tried; and therefore one may say as regards the type or standard—such as tray conveyor, scraper, or drag conveyor—there is nothing new to introduce. But until the past year or two, attention was chiefly devoted to the actual operation of carrying the coke, to the neglect of the general detail work, and the effect of the excessive heat and strain placed on the apparatus. In some cases good points have had to be sacrificed because of the preference of the engineer in connection with some minor detail; or perhaps local circumstances or surroundings have formed obstacles before

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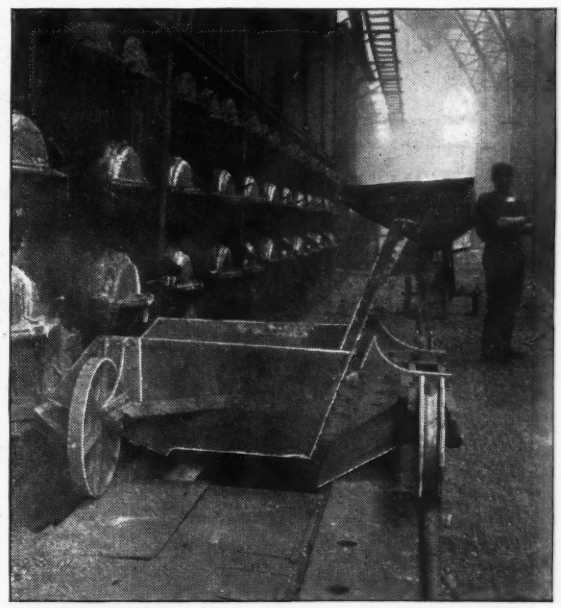
which a good quality which would have assisted in the promotion of success has had to give way. However, at the present day, there are several hot-coke conveyors on the market, all of which are based on the alphabet of design for handling coal or ash, but which differ slightly in design, and more especially in detail work. And these are to be found not only in gas-works, but in chemical works and at collieries, for dealing with the hot coke from extensive ranges of coke-ovens.

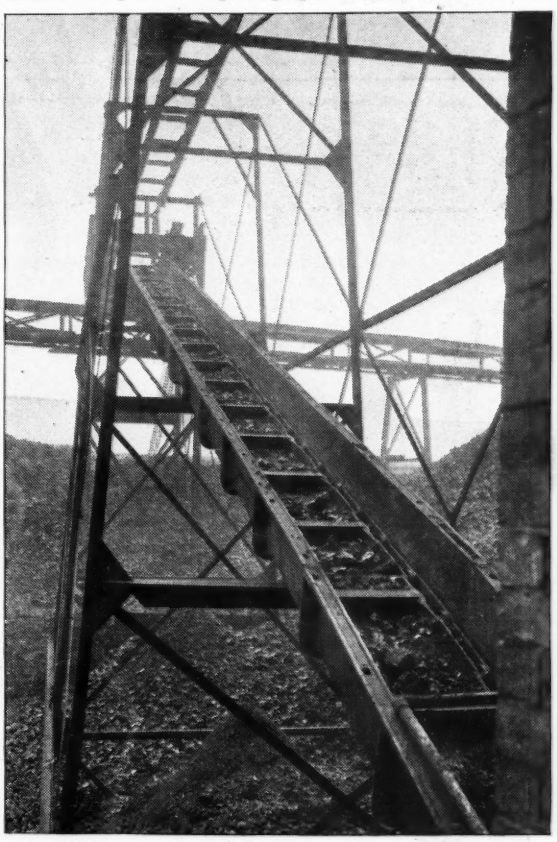
We are able to-day to describe and illustrate (through the kindness of Mr. R. H. Townsley, the Engineer and Manager of the Leeds Corporation Gas-Works) the system of coke-conveying which has been laid down at the Meadow Lane station. The plant is known as the Graham patent hot-coke conveyor (the patents being in the name of Maurice Graham), and was made and erected by Messrs. Graham, Morton, and Co., Limited, of Leeds.

The retort-house to which the plant is applied contains 28 beds of inclined retorts, 20 feet long, which are arranged with fourteen beds on each side, and a large and comfortable charging-stage between the two benches. The drawing-stages are on the outsides, and are at a height of about 10 feet from the ground floor-line, thus constituting a stage-floor house. Upon looking at fig. 1, it will be seen that, in the original design, the coke was shot below, through the opening between the stage and the bench, and fell into the trucks beneath. To avoid the excessive smoke, steam, and other fumes arising from the quenching of the coke, it was decided



Copyright.] FIG. 2.

to adopt hot-coke conveyors, which could be fitted to the existing house, and which would overcome the difficulties previously experienced. There are two conveyors, and each is about 260 feet long—consisting of a continuous cast-iron water-tight trough, which is fixed underneath the existing transverse stage joists, as illustrated in fig. 1. This photograph was taken with a number of



Copyright.] FIG. 3.

lids open purposely to show the patent roller-chain and deflecting-plates for protecting the chain from the falling hot-coke, and distributing the material between the T-iron scrapers. These scrapers do not touch the trough; and therefore do not increase the friction on the plant. In the background will be seen the receiving-hopper for feeding the conveyor.

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FIG. 4.

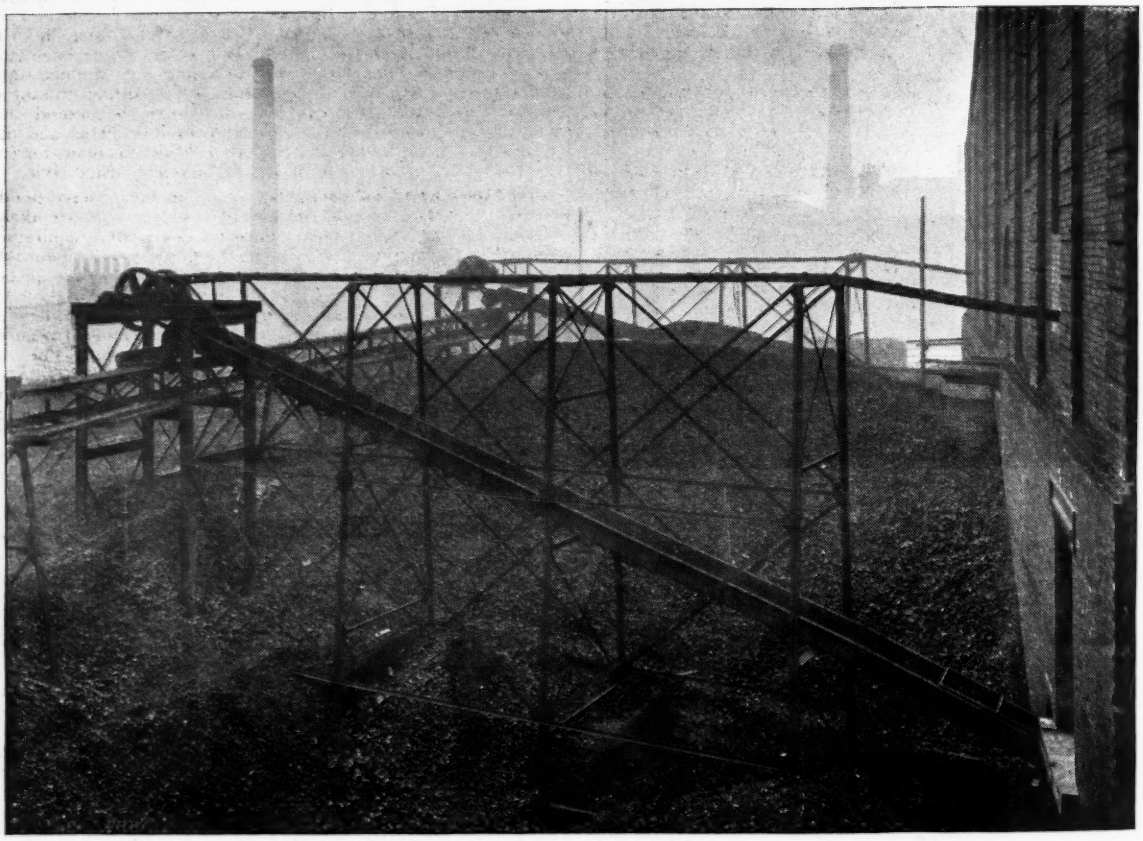

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FIG. 5.

THE COKE STORING AND DISTRIBUTING PLANT AT THE LEEDS GAS-WORKS.

The bottom of the trough is provided with raised guides or tracks for the roller chain to run upon. The necessary water-pipes and sprinklers are fitted inside the troughs for quenching the coke, in the same manner as is done over the tipping-trucks under the stage-floor.

When a retort is to be drawn, the receiving hopper is brought into position over the opening in the conveyor, as indicated in fig. 2. It will be noticed that the four sides of the hopper incline towards the centre. In the event of the whole of the charge rushing from the retorts, the hopper is made large enough to receive this; and the conveyor rapidly draws the coke away—the coke being quenched by the sprinkler on the next bed. It should be made quite clear that there is not always water in the conveyor-trough, as there is no blank flange on the end of the trough. This is arranged purposely in order that the amount of water used may be ascertained by the foreman in charge by merely inspecting the overflow, and for the main object of not drowning the coke. When the conveyor is stationary, the trough is empty.

The design of the receiving hopper is very neat; and the apparatus is arranged to run in front of the beds with the lids of the conveyor either open or closed.

At the delivery end of the conveyor, the cast-iron trough rises on the incline (similar to ash plants for boiler-houses), and is built up of the same design of cast-iron trough, but without the deflecting plates, as these are unnecessary in this position, there being no falling coke.

Fig. 3 is a photograph showing the patent steel roller-chain. This is of massive design, and is fitted with 4½ inch diameter cast-iron rollers, a special pattern of cast-steel link, with distance pins, and a renewable push-bar (made of 3½ in. by 3½ in. by ½ in. T iron), which drops in the bearer attachment. It will therefore be seen that at any time the bars are easily renewed from stock.

Fig. 4 is a photograph of the head of one of the conveyors, and illustrates the return chain running along an angle-iron track. This track is supported by a neat and light bracket, which is fastened to the front buckstays of the bench, as shown on fig. 2. The simple form of driving gear required for operating the plant, owing to the small horse power needed (attributable by the makers to the pattern of roller chain used), will also be observed. The two hot-coke conveyors are driven by one gas-engine; the power being transmitted by shafting and detachable chain-belt as depicted.

The countershafts and gearing at the end of the hot-coke conveyor consist of a primary countershaft, with sprocket wheel supported in two pedestals, and provided with loose collars and cast-iron stools. Keyed to this shaft is a 10-inch diameter pinion, which will transmit the power to the conveyor secondary countershaft, on which is keyed a 3-feet diameter spur-wheel, and also a pinion to gear with the large spur-wheel on the driving-shaft of the conveyor.

The general appearance of the structure for supporting the two hot-coke conveyors is substantially strong and neat, and not too heavy; there being no unnecessary weight of material fixed, and every member of the structure has a duty to perform. The general design has been carefully thought out to avoid waste of material. The sections of steel are the usual—H, steel, channels, angles, flats, &c. Figs. 4 and 5 are views of this structure.

Having now described the "Graham" patent hot-coke conveyors, we will turn our attention to the cold-coke conveyor and coke storage tanks, which are erected for the purpose of loading waggons, carts, &c. In fig. 4, a general longitudinal view of the storage plant is seen. The conveyor, which is 300 feet long, consists of an endless belt of steel plates joggled on one side, so that the plates overlap one another, and thus form, when fixed to the chain, a perfectly flat table as shown. There are two strands of solid steel chain, and necessary attachments for fastening to steel plates. The driving and trailing drums are of a special design, with teeth shaped so as to obtain a direct grip. The steel belt is supported on the top strand by intermediate rollers, bearings, filbows, brackets, &c., attached to the framing of the conveyor.

Another feature which will be noticed in fig. 4 is the series of steel ploughs for throwing the coke off the conveyor at any required point. These are regulated by the attendant in charge as requirements demand.

The coke is sorted by a screen, 10 feet long by 3 feet diameter, with a taper in the length. It is then raised by the elevator on to the steel belt conveyor, and carried to the large coke storage tanks as shown.

The elevator is 18 inches wide and 44 feet centre to centre, supplied complete with a continuous type of buckets. The boot is built up of steel plate, and arranged with adjusting screws, sliding blocks, sprocket wheels, shaft, and loose collars. The top fittings consist of two pedestals bolted on to the channel-iron structure, supporting the top shaft with sprocket wheels and loose collars. The framing is of standard section, consisting of four angle-iron runners, stayed together by means of angle-iron bolts and the whole well cross-braced with flat iron; the buckets being protected on their return side by means of steel plates. The chain is also of improved patent steel roller type, with attachments pitched 12 inches apart. The buckets are of the continuous type, forming a continuous band of plate; this form of bucket being specially adapted for protecting the working parts of the elevator from being injured by the gritty breeze and the coke.

The hopper at the bottom of the elevator is built up of ¼ inch steel plate; the sides being flanged and riveted to the ends, to form a substantial hopper. At the bottom is arranged a patent feed for regularly and continuously feeding the elevator buckets as they pass. The top shoot is built to suit the casing, and for delivering the coke into the screen hopper.

The screen hopper is built up of ¾-inch steel plate, the sides flanged and riveted to the ends, and arranged in the hopper or self-emptying form with a spout for delivering the coke into the revolving-screen.

The coke storage tanks are about 14 feet long by 10 feet wide by 13 feet deep, and form a continuous store supported on cast-iron columns and joist work. All necessary slides, levers, &c., are provided for regulating the delivery of coke, as required, from the tanks.

The whole of the storage plant in the yard is driven by one gas-engine, which transmits the power through a long shaft fixed to the conveyor; and the separate portions of the plant obtain their power by belt drives. The plant has been running a considerable time now; and, we are informed, it works very smoothly indeed. It is practically noiseless; and no scraping or jarring is experienced. The roller chain and the closed-in trough with the deflecting-plates for protecting the chain, together with the arrangements for quenching the coke, are features which the gas engineer will not fail to take into consideration when investigating the relative merits of the different systems from which he has to make a choice. We learn that the patents cover the exhaustion of the steam and drying of coke during transit; but in this particular case a vertical ventilating shaft is being built at the end of the conveyor to take off the steam.

Looking at the plant generally and over the details of its construction, one is left with little doubt that the makers, Messrs. Graham, Morton, and Co., Limited, have devoted considerable time, thought, and industry to its perfecting; and upon the excellent manner in which they have carried out the installation at Leeds, we may congratulate them. They have aimed at giving complete satisfaction; and we believe that they have entirely succeeded.

Joint-Stock Companies in 1900.—According to statistics published in the "Investors' Guardian," there were 4511 new companies registered last year, with a total capital of £204,183,328, as compared with 4529 companies, with a capital of £234,687,296 in the preceding twelve months. For the supply of gas, £1,672,391 was asked for; for water supply, £19,000—the figures for 1899 being £1,105,700 and £231,000. For electric lighting there was a falling off—£7,720,050 last year, against £11,192,790 in 1899.

"Engineering Estimates and Cost Accounts" is the title of a little work by Mr. Francis G. Burton, A.S.A.A., formerly Secretary and General Manager of the Milford Haven Shipbuilding and Engineering Company, the second edition of which has just been issued by the Technical Publishing Company, Limited, of Manchester. It differs in only a few small matters from the first edition; the author's further experience not having led him to alter the method of accounts recommended. A chapter is devoted to "Gas and other Engines;" and one has been added on "Cost Accounts for Small Works." The book is got up in the Company's usual style.

Forthcoming Gas Coal Contracts.—Our Manchester correspondent writes: "Of the large and important contracts that are likely to come upon the market shortly, those for gas-making requirements will, in all probability, first engage attention; and the Lancashire coalowners have recently had under consideration the question of the attitude they should take up with regard to prices. Last year, it will be remembered, there was a recognized understanding between the Lancashire and Yorkshire colliery owners to enforce a minimum advance of 5s. per ton over the 1899 prices; and the general basis on which gas coal contracts were settled throughout Lancashire represented about 13s. 6d. to 14s. for medium sorts, and 14s. 6d. to 15s. for the better qualities of screened gas coal, at the pit. When, towards the close of last year, it became evident that trade was on the down grade, the Lancashire collieries recognized that they would not be able to maintain the prices they had enforced without difficulty on the 1900 contracts; but there was a very generally expressed opinion that the altered situation might be met by a concession of about 1s. per ton. Since then, however, the downward move of prices has been much more serious than was evidently anticipated; and at a recent meeting of the Lancashire coalowners, it was practically decided that the tenders for the forthcoming gas coal contracts should be based upon a reduction of 2s. 6d. per ton on last year's rates—that is, that half the advance then put on should now be taken off. Supposing there is no further change in the situation, the basis on which the gas coal contracts for the ensuing twelve months will probably be tendered for may be put at about 11s. to 11s. 6d. per ton for medium sorts, and 12s. to 12s. 6d. for better qualities at the pit. Whether this will fully meet the views of buyers remains to be seen. The managers of some of the largest gas-works have stated that it would certainly be the maximum basis they would be prepared to consider, and that, even with this concession, they would buy only very cautiously, as they hold the opinion that prices later on are likely to be still lower, and that there is no need for the anxiety which was so general last year with regard to securing their full requisite supplies. The position is one that is likely to bring forward some very keen competition on the part of the collieries in the various districts; and the outlook is in favour of buyers of gas coal being able to cover their requirements on far more favourable terms than could have been anticipated only a short time back."

NAPHTHALENE REMEDIES.

The naphthalene question has recently again been the subject of communications to the pages of the "Journal für Gasbeleuchtung;" and we propose to refer to the salient points of these communications in the sequel.

Dr. Erlenbach, a Chemist, of König Ludwig, in Westphalia, is the author of one, which is really the reprint of a paper read before a District Association of Gas, Electricity, and Water Engineers, at Cologne, in January last. He points out that it is practically impossible to avoid the formation of naphthalene in the carbonization of coal, and that the high temperatures now commonly adopted favour its formation at the expense of other hydrocarbons. The greater part of the naphthalene formed naturally goes into the tar; but the gas, after it has traversed the condensers and purifying plant, contains varying quantities, which may be regarded as corresponding to the limit of saturation of the gas. Such quantities would be:—

At 68° Fahr., 24·5 grains per 100 cubic feet.
" 50° " 14·0 " " "
" 32° " 6·1 " " "

From these figures it follows that gas which contains 14 grains of naphthalene per 100 cubic feet will deposit no trace of naphthalene at a temperature of 68° Fahr. Deposition will first occur at a temperature below 50° Fahr. Apart from the amount of naphthalene which the gas contains, its chemical composition has no bearing on the deposition of naphthalene; and any attempt to trace a connection between the presence and separation of naphthalene, and the presence of certain substances—so-called "naphthalene carriers," among which, for example, ammonia is classed—is, according to Dr. Erlenbach, misleading. The deposition of naphthalene takes place in reality on simpler lines, and follows precisely the laws which govern gaseous or volatile substances. Consequently, naphthalene deposits in the distributing system can occur only if the external temperature is below that of the gas as it leaves the works; and the greater the difference of temperature in this direction, the greater will be the ill-effects observed.

Dr. Erlenbach names three ways of avoiding naphthalene deposits in gas mains—viz.

1.—The admixture of cooled and purified coal gas with some description of gas which is inherently free from naphthalene—such as water gas. This dilution of the gas lowers the partial pressure of the naphthalene, and serves to prevent the appearance of solid naphthalene under ordinary circumstances.
2.—The washing of the gas with a substance which has the property of absorbing naphthalene. Putting aside proposals of theoretical interest, the Young-Bueb process only has been introduced technically. By it, the gas is washed, after it has traversed the tar-extractors, with heavy coal-tar oil, to which a small percentage of benzol has been added.
3.—The introduction into the gas of substances which will be thrown down along with the naphthalene when the gas is cooled, and will prevent the occurrence of solid deposits. Substances of this kind which have been used technically, are: Spirit (alcohol), a mixture of spirit and benzene, and crude xylene.

Spirit has been largely adopted in gas works [Dr. Erlenbach is, of course, speaking primarily of Continental works], because it has been regarded as a remedy for every description of obstruction in the distributing system. Actually, however, spirit serves only to prevent and remove ice and crystallized benzene, and these rarely occur alone. It has no effect on naphthalene deposits. Though spirit of high strength can dissolve from 4 to 5 per cent. of naphthalene, this fact is of no practical importance, as a very moderate addition of water, which in use occurs forthwith, suffices to prevent entirely this solvent action. This fact may be demonstrated readily by adding a few drops of water to a saturated solution of naphthalene in spirit; the water throws down the naphthalene in the solid state.

A mixture of spirit and benzene has been put on the market under a high-sounding name, by a firm in South Germany. On coming in contact with water and ice, this liquid resolves itself into its components, and two layers are formed, of which the lower consists of diluted spirit and the upper of benzene. Benzene

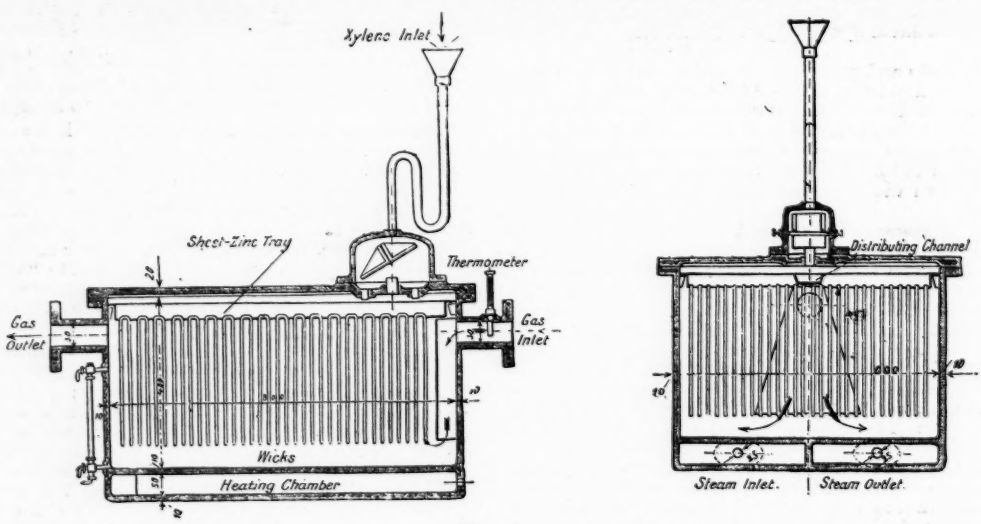


FIG. 1.

XYLENE CARBURETTING APPARATUS FOR PREVENTING AND REMOVING NAPHTHALENE STOPPAGES.

solidifies above 32° Fahr., and consequently there is presented the risk of supplementing naphthalene and ice which may be present with solidified benzene. Hence Dr. Erlenbach thinks that the mixture of benzene and spirit is not a very happy choice, when it is applied in the form of vapour. The amount of benzene required to saturate 1 cubic foot of gas at 32° Fahr. is 50·6 grains; and a smaller proportion of benzene than this can be of no value, in virtue of its action as a solvent for naphthalene. Consequently, the addition of the mixture of benzene and spirit in the form of vapour to gas is practically useless.

The last, and most recent, method—viz., the use of crude xylene—is not merely founded on sound theoretical considerations, as has been established by Drs. Bunte and Eitner,* but has already had an extensive practical application. Crude xylene is a light coal-tar oil of a pale yellowish colour, and sickly odour, and having a specific gravity of 0·880. It does not solidify under extreme cold. Ninety per cent. of it boils over up to 300° Fahr. Its elementary composition approximates to the formula C_8H_{10}. It is free from constituents which might vitiate the purity of the gas. The experiments made in Dr. Bunte's laboratory showed that 100 parts by weight of xylene dissolved at 50° Fahr. 29 parts, and at 32° Fahr. 21 parts, by weight, of naphthalene. Also that 100 cubic feet of gas take up at 50° Fahr. 1090 grains of xylene and 14 grains of naphthalene, and at 32° Fahr. 740 grains of xylene and 6·1 grains of naphthalene. Hence, if the gas is saturated at 50° with xylene as well as naphthalene, on cooling it to 32° there separate out 350 grains of xylene and 7·9 grains of naphthalene—that is to say, xylene sufficient to preclude completely any deposition of solid naphthalene. Thus the purpose aimed at is attained; the naphthalene is carried away in solution to the nearest syphon-pot, whence it can be removed by pumping. The process answers equally well for outside temperatures above and below 32° Fahr. In all cases, so much liquid is deposited from the gas which has been carburetted with xylene that the formation of crystals of naphthalene is absolutely prevented.

The means to be adopted to prevent naphthalene stoppages thus appear to be clearly defined. Vapour of crude xylene must be incorporated in sufficient quantity with the gas at the works. In the depth of winter an amount of about 875 grains per 100 cubic feet should amply suffice. This quantity can be reduced, according to circumstances. The action of the xylene extends to the utmost confines of the distributing system. The evaporation of the crude xylene can be effected in most of the ordinary carburetting plants; but Dr. Erlenbach strongly recommends the evaporator which is shown in fig. 1. It has been used with excellent results by Herr Klose, the Manager of the Solingen Gas-Works. It comprises a cast-iron box having a double bottom, by means of which it can be heated by steam. In the upper part is a perforated plate, from which cotton wicks hang down. The crude xylene is discharged into the apparatus by means of a tumbling-box, to which an index or counter may be connected. The evaporation of the xylene takes place so thoroughly that the

* See "JOURNAL," Vol. LXXIII., p 437.

apparatus will readily work through any winter season without requiring cleaning. The carburetting with the crude xylene is carried out by diverting through the apparatus a part of the stream of gas flowing from the holders, and then by means of a short connection returning this gas, saturated with xylene, to the main stream after the governors.

The cost of the volatilization of the crude xylene is not considerable, because the apparatus does not require to be kept constantly in action. When cold weather commences, it should naturally be immediately put into use. The apparatus of the dimensions shown in the illustrations (in which the figures are millimetres) is suitable for a daily output of 880,000 cubic feet of gas. It is obtainable ready for use from two houses in Germany.

Dr. Erlenbach proceeds to say that the vaporizing of crude xylene presents the surest and most rational means of avoiding naphthalene deposits. If, however, the mains are choked by old deposits, washing them out with crude xylene is the most satisfactory procedure. The naphthalene is in this case also carried in solution to the nearest syphon-box. Special apparatus is not really necessary for this washing-out; but Dr. Erlenbach mentions that a Berlin firm supply a suitable portable spraying appliance. If it is doubtful whether an obstruction is caused by naphthalene or ice (or frozen benzene), he thinks it best to employ a mixture of equal parts of crude xylene and spirit. The property possessed by the xylene of not solidifying, even at the lowest temperatures, in such a case gives it a great advantage, because no harm can possibly ensue from its employment. It should be pointed out that, though the illuminating power of the gas is improved by the use of crude xylene, smoky flames do not result, as happens when anti-naphthalene compositions consisting largely of benzene are employed. Crude xylene till recently had been produced exclusively in the distillation of tar; but at König Ludwig it is now produced, along with other aromatic hydrocarbons, as a bye-product from coke ovens. The yield is about 20 per cent. of the quantity of benzene produced at the same time.

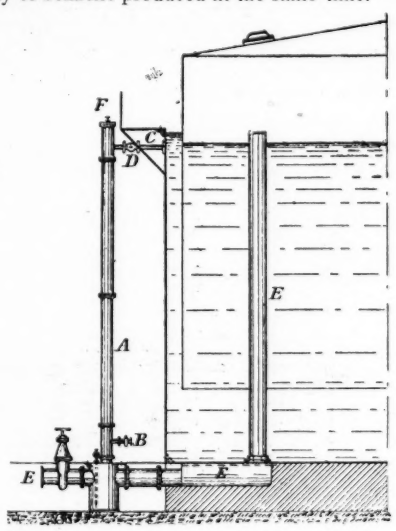


FIG. 2.

Turning from Dr. Erlenbach's paper, we will refer to a description of an arrangement adopted by Herr Deegen, of the Wittstock Gas-Works, for getting rid of naphthalene obstructions in the inlet and outlet mains of gasholders. In his own works, he had a holder with a wrought-iron tank; and his arrangement is specially applicable to such cases. It is shown in fig. 2, in which A is an upright pipe, with branch and cock B at its lower end, and a connection C, with cock D, to the gasholder tank. The pipe A is connected with the gasholder main E, either at the syphon-pot or directly by means of a T-piece; while the tube C enters the holder tank about 20 inches below the top flange.

To bring the arrangement into operation, the valve on the gas-main E is closed, thus isolating the portion shown; and the cock D is then opened, so as to allow water from the tank of the holder to fill both the pipe A and the main E. As soon as they are full, the cock D is closed; the cap F on the pipe A is removed; and the column of water in the pipe is set in oscillation by means of a plug of wood wrapped round with tow so as to form a well-fitting plunger, and attached to an iron rod, which is moved up and down. The motion of the column of water scours off the deposited naphthalene; and the cap F is then screwed on again, and the small air-tap on it opened. The cock B, at the lower end of the pipe A, is opened, and the greater part of the water is run off through it; while the remainder is removed by pumping through the syphon-pot. After the pipe has been thus emptied, the air-tap on the cap F is closed, and the valve on the main E is re-opened, thus putting the main again into service. The small quantity of water removed from the tank is soon replaced by rainfall. The whole procedure of washing-out takes up very little time, provided the water required can be drawn direct from the gasholder tank.

A somewhat similar plan to that introduced by Herr Deegen was devised by the late Herr Mohr, when he was Chief Engineer to the German Continental Gas Company at Dessau. It was applied to the masonry tank of a gasholder at Brandenburg, and in other instances, as shown in fig. 3. There is no connection between the upright pipe and the gasholder tank; and the pipe

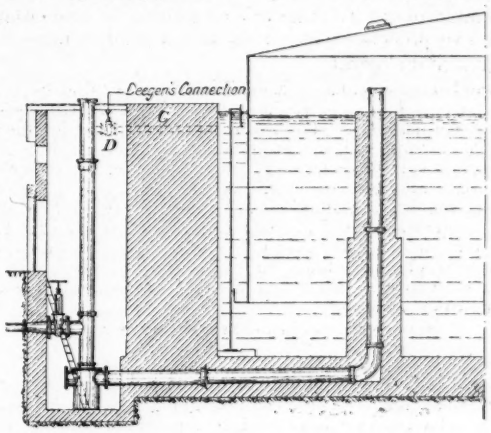


FIG. 3.

must first be filled up with water, which is not necessary with Herr Deegen's arrangement. The Deegen connection between the upright pipe and the tank can, however, be applied also in the case of a masonry tank, as indicated by the dotted lines C D.

The Tallest Chimney in the World.—In the "Note" on this subject in the last number of the "JOURNAL" (p. 677), the internal diameter of the chimney should have been given as 8 feet.

Oxygen in Gas Poisoning Cases.—The treatment by oxygen of persons poisoned by carbon monoxide, is dealt with by M. Gréhant in a recent number of the "Comptes Rendus." He shows that the elimination of the poison is considerably accelerated by the employment of oxygen, which thus becomes essential in the treatment of these cases.

New Issue of Capital by the North Warwickshire Water Company.—As will be seen by an advertisement elsewhere, the North Warwickshire Water Company are inviting tenders for the purchase of 1949 5 per cent. preference shares of £10 each; this being the balance of the preference share capital authorized by the Company's Act of last year. New areas adjoining the Company's present system are in urgent want of a proper water supply; and this issue is being made primarily to enable the Directors to construct further works and to extend the mains to meet this want.

Newtown Gas Arbitration.—An incidental reference was made in last week's issue to the award of Mr. James Mansergh, the President of the Institution of Civil Engineers, in the matter of the Newtown gas arbitration. It will be remembered that the Arbitrator for the Company was Mr. J. Shiress Will, K.C., and for the Corporation Mr. W. A. M'Intosh Valon, J.P. The sum awarded is £32,857. The lowest claim for the Company was £48,542 (including 10 per cent.), and the highest for the District Council (also including 10 per cent.) £25,678. The award is therefore £7179 above the Council's valuation, and £15,685 below the Company's.

Investigations Relative to Water Supply.—At the sixth general meeting for the present session of the Glasgow Association of Students of the Institution of Civil Engineers, Mr. J. Brown read a paper on "Preliminary Investigations Relative to a Water Supply." The author first dealt with the question of average daily consumption, and showed how it is affected by the character of the district proposed to be supplied, the habits of the population, the trades carried on, and by the climate. Proceeding, he showed how industries, feuing, travelling facilities, and even the water supply itself, tend to cause changes of population; and this, he pointed out, required to be taken into consideration in drawing up a scheme for the water supply of a town or district. The choice of a source of supply and the conditions governing it, more particularly the quality and quantity of water, and the cost at which it might be obtained, were dealt with. A discussion followed.

Arsenic in Coke.—Mr. A. L. Steavenson, of Durham, reminds us that arsenic has long been known as a constituent of coal, more particularly, perhaps, of pyrites. He points out that it was found by Daubree, Dr. Angus Smith, and Dr. Percy. Mr. Steavenson adds: "In the year 1859, when I was engaged in the preparation of my first paper upon the manufacture of coke, and had occasion to look into its history, I found that the first coke-ovens of which there appeared to be any record were nine kilns upon the edge of the river at Newcastle, 'to destroy the sulphur contained in the coal, and to reduce it to what is called "cinders and coaks." The principal use of the cinders is to heat the malting-kilns; it is also used by a silversmith.' The date of these ovens was A.D. 1765. So that, although we know coke has been used for malting for about 150 years, and although the consumption of beer has no doubt cost many thousands of lives, no complaint of the arsenic it contains has until now ever been heard. See 'Voyages Métallurgiques,' 1774, by M. Jars."

NOTES.

The Cost of Steam Transport.

As a record of the economical possibilities of steamship transport, it is stated, in an account published in "Engineering," that a wonderful trial has been run by the latest additions to the Inch Line of steamers, owned by Messrs. Hamilton, Fraser, and Co., of Liverpool. The engines of these vessels, the sister ships Inchdune and Inchmarlo, were made at the Central Marine Engine-Works, West Hartlepool. They are a modification of the quadruple expansion five-crank type of construction introduced by the late Mr. Mudd, and fitted to the Inchmona. The alterations made in the design have been fully justified by the results obtained, both as regards actual working of the machinery and economy of fuel. The working pressure has been increased to 267 lbs.; and the steam is superheated to a temperature approaching 500° Fahr. The general result is that, on an extended trial from Hartlepool to Dover, the coal consumption worked out at 0·97 lb. per indicated horse power. If this is made up to a level pound of coal, it works out to 15½ tons per day for a ship carrying 6170 tons of cargo at 9½ knots, or to 13¼ tons at the tramp-speed of 9 knots. This means that one ton weight of cargo is transported one nautical mile on a coal consumption of about one-third of an ounce. Taking the cost of the coal in the bunkers at 15s. per ton, a ton of cargo is carried upwards of 550 miles for a pennyworth of coal. At this rate, the importation of coal into England from the bituminous coalfields of North America would not prove prohibitively costly, as a matter of fuel expenditure.

Paraffin for Coating Gas-Pipes.

It has been suggested in the "Ironmonger" that the manifold uses of paraffin wax in engineering work are neither properly understood nor appreciated. It is remarked that the employment of solid paraffin for filling the joints of wooden water-cisterns is not altogether unknown among handy mechanics; but carpenters usually apply white lead to the edges of boards before putting them together to hold or keep out water. Pitch or asphalte has similar uses. A Canadian technical journal, however, has been recently suggesting that paraffin wax has peculiar properties which render it very suitable for use in many ways in connection with work in metal. It is not soluble in cold water, is entirely non-volatile, and chemically inert. Melted and laid on the surface of a metal, it closes all minute cracks and pores better than any other known substance; and will remain there for ever until liquefied and expelled by heat. It closes iron castings so effectually that gas or air under high pressure cannot be forced through it. It is well known that cast iron is, under certain conditions, permeable by coal gas at ordinary pressures; and the porosity of iron castings under high gas or air pressures is sometimes a grave inconvenience. The usual expedient followed in the case of water-mains—dipping in a bituminous preparation—is unsuitable to gas-pipes. An example is mentioned of a foundry near New York which some time ago had a contract to make castings for compressed air apparatus, which were required to be tight under an air-pressure of 100 lbs. To meet the requirement with hollow castings proved more difficult than had been supposed. Very few castings stood the test, and threatened to be a loss until it was suggested to heat them and apply, or dip them in, melted paraffin. This at once corrected the trouble. The same treatment, it is remarked, will render malleable iron fittings permanently impervious to coal or carburetted water gas.

American Pipe Casting.

It is reported in the "Engineer" that the manufacture of cast-iron gas and water main-pipes in the United States has become a highly-developed industry. By economical and systematic management, by the introduction of labour-saving devices, and by using patterns, flasks, &c., over and over again, pipes can be made so cheaply that they can be sold at a profit at from £3 to £5 per long ton. Ordinary iron castings are priced at from 1d. to 2½d. per pound. In 1869 the City of Brooklyn paid £14 13s. 6d. per ton for 6-inch pipes, and £14 16s. for 20-inch pipes. Towards the end of 1900, contracts were made for 6-inch pipes at £4 12s. 6d. and £4 3s. 6d. per ton of 2000 lbs.; and for 20-inch pipe at £4 3s. 1d. The exporting of American cast-iron pipes is already becoming considerable; but the exact amount is not recorded. The imports of cast-iron pipes are now insignificant. There is a Pipe Trust, of course, called the United States Cast-Iron Pipe and Foundry Company, with a capital of £6,000,000, and an aggregate capacity of about 3000 tons per day. This combination claims to represent 67 per cent. of the pipe output of the country; but many good firms remain independent—the largest being that of Messrs. R. D. Wood and Co. The new Carnegie Steel Company are not interested in cast-iron pipes. Very large cast-iron pipes are made in the United States, up to 72 inches diameter, in 6-feet lengths. These large pipes are only used for drainage culverts. There is a growing preference for the use of cast-iron pipes for railway and highway culverts, and general drainage purposes. They are more readily and quickly laid than masonry; are not so liable to be washed out as is the low-class brickwork usually put into such works; and are easily cleaned. There are also fewer joints, and there is less liability to fracture than with vitrified clay sewer pipes. Pipes condemned for water or gas can generally be used up for drainage purposes. The standard length of American cast-iron pipes is 12 feet.

REGISTER OF PATENTS.

Producing Coke, Gas, and Bye-Products.—Naef, P., of New York. No. 2917; Feb. 13, 1900. Date claimed under International Convention, July 20, 1899.

Here are five more specifications of the same inventor, as the Patent Office authorities required his one lengthy description and series of claims to be divided up, as on previous similar occasions—declaring that it was not one but five separate inventions that were described. As was remarked in regard to the earlier application (see *ante*, p. 623, and Vol. LXXVI., p. 1447), it is impossible for the "JOURNAL" to do more than indicate in general terms what—in the opening words of the specifications—the patentee claims.

He says: "The invention relates to the manufacture of coke, illuminating or fuel gases, and bye-products—such as ammonia, cyanide, and tar-oils. The objects of the invention are: The production of very large quantities of coke in a single apparatus, with recovery of bye-products and gas; to produce coke and bye-products and gas without waste of heat; to recover, if desired, as much tar-oil as possible of a superior quality; to recover a large percentage of the nitrogen of the coal as ammonia; the coking of fuel by means of coke-dust or other cheap fuel; the use of plants of large dimensions and large capacity; to reduce the pressure required for forcing gas through fine fuel; improved method of conducting gas through fine materials; and to devise improved means for charging and discharging materials from such apparatus. The invention further consists in improved methods for conducting air or hot gases through fuel in such a way that coke, tar, ammonia, and gas are produced. It also refers to the apparatus, and special construction of the same"

Raising and Lowering Gas-Lamps.—Winkler, H., of Berlin. No. 6330; April 4, 1900.

This invention is designed to enable gas-lamps of high power, when used in streets, to be raised and lowered without cutting off the gas supply, by employing a combination of jointed gas supply-pipes which can move in vertical parallel planes—means being provided (such as cords wound upon a windlass, and attached to the lamp and to the jointed pipes) for raising and lowering the lamp and pipes.

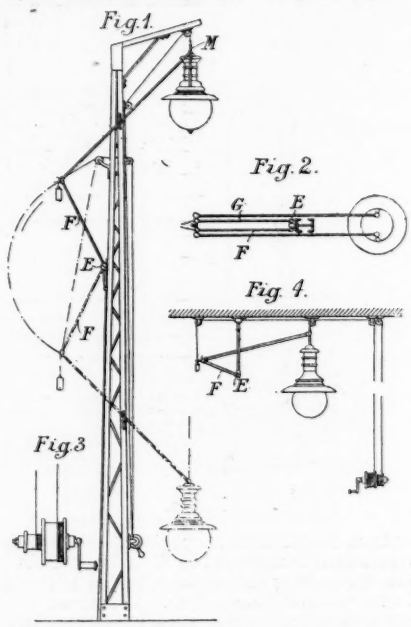


Fig. 1 shows the application of the invention to a lamp-post having a lamp suspended therefrom. Fig. 2 is a plan of the jointed pipes as they appear when in a horizontal position. Fig. 3 is a detached view of the windlass drawn to a larger scale. Fig. 4 illustrates the invention applied to a lamp suspended from a high ceiling or roof.

In applying the invention to a lamp-post, the pipe supplying the gas, and also the pipe (not shown) supplying compressed air where used, are fixed to the post up to a suitable point E, where they are jointed to intermediate pipes F and G, to the outer ends of the intermediate pipes are jointed pipes which connect with the lamp. These guide-pipes are arranged upon the two sides of the post, as shown in fig. 2, and are secured by means of joints to the upper part of the branched lamp supply-pipe M in such a manner that one passage is fed with compressed air and the other with gas. Stops are fixed on the post for limiting the upward and downward movement of the pipes.

When no compressed air is used, the air supply-pipes up to the intermediate pipes F and G are dispensed with; but both the guide-pipes are advantageously retained, as they protect the lamp from swaying in an injurious manner.

If the lamp be lowered by turning the windlass or drum backwards, the weight of the lamp presses in the direction of the length of the guide-pipes upon the intermediate pipes F G, so that the latter turn downwards upon the joint E as a pivot, whereby the lamp gradually descends into the position indicated by the dotted lines in fig. 1.

The path passed through by the joints connecting the intermediate pipes and the guide-pipes when the lamp is lowered, is considerably shorter than that simultaneously passed through by the lamp. For this reason, therefore, the winding-drums N O, which are mounted upon the same axle, are of different diameters (as shown in fig. 3), so that

the cord passing over the lower pulleys and secured to the pipe-joints, unwinds more slowly than that passing over the upper pulleys secured to the lamp. As, however, the velocity of the joints is not solely dependent upon the speed of rotation of the drum controlling its cord, but is also influenced by the guide-pipes (because the pipes act, according to the position and movement of the lamp, either with a pull or push upon the joints), it is possible that the cord may become slack upon its rollers. In order to avoid this, the upper end of the cord is loosely drawn through an eye fitted at the joint, and is provided with a tension weight, which also serves to regulate the movement of the jointed pipes.

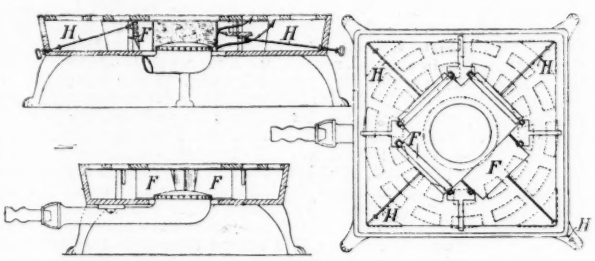
In applying the invention to a lamp fitted to the roof of a room (as in fig. 4), the fixed gas supply-pipe secured to the ceiling is connected at its lower end by a gas supply-joint E to an intermediate pipe F, jointed to a pipe attached to the lamp.

Light Measuring or Calculating Apparatus.—Poliakoff, J., of Moscow. No. 18,358; Oct. 15, 1900.

This invention relates to photometric instruments by which the relative intensity of light is measured or compared with a standard. It includes electrically-operated devices for visibly indicating such intensity, and embraces the class of instruments denominated photometers, actinometers, actinographs, exposure meters, and the like. It has for its object the measuring of the intensity or duration of illumination by means of a photo-electric cell or resistance included in an auxiliary circuit, and auxiliary means for making a permanent measurable record of the same.

Gas Boiling-Stove.—Schmitz, W., of Hamburg. No. 22,277; Dec. 7, 1900.

This is a gas-stove wherein chambers separated from each other by transverse partitions are arranged around the bunsen burner, and adapted to be shut off from the burner by flaps adjustable from the outside, so that the heating gases may pass to any one or more of the several chambers.



The illustration shows a diagonal section of the stove, a transverse section, and a plan—the grate being indicated by dotted lines.

The burner extends through an opening into the interior of the boiler, which presents the shape of a flat box, the interior of which is divided by means of transverse partitions into several chambers, which may be shut off from the burner by flaps F adapted to be turned about horizontal axes. The flaps (which when open form deflectors for the heating gases) are adjusted from the outside by draw-rods H, having handles, so that the gases are at will admitted to one or the other outer chamber. In the diagonal section, the left-hand flap F is closed, while the right-hand flap is open (see also the plan); so that the heating gases pass to the bottom right-hand chamber, while the other three chambers are shut off from the central chamber.

APPLICATIONS FOR LETTERS PATENT.

4354.—Hepworth, M., Smethurst, J. A., and Whyman, E., "Combination mantle holder and anti-vibrator for incandescent lights." March 1.
4377.—East, W., "Gas and oil burners and stoves." March 1.
4384.—Blanchard, J. T., "Gas turbine power motor." March 1.
4395.—Borchardt, H., "Lighting gas." March 1.
4405.—Booth, S., "Incandescent gas-lamps." March 1.
4428.—Friedländer, H., "Incandescent lamps." March 1.
4432.—Richmond, E. W. T., and Thornton, H. M., "Gas-fires." March 1.
4442.—Eagles, J., "Gas and oil engines." March 2.
4485.—Lisle, E., and Prew, G. F., "Carburettors." March 2.
4522.—Pintsch, J., "Gas for power purposes." March 2.
4527.—Barwell, J. H. & H., and Kimberley, H. P., "Gas-brackets, gasaliers, and the like." March 2.
4541.—Goldstraw, E. M., "Incandescent gas lighting and burners." March 4
4544.—Simpson, S., "Gas cooking-stoves." March 4.
4545.—Simpson, S., "Gas-meters." March 4.
4546-7.—Simpson, S., "Gas-stoves." March 4.
4646.—Southall, J., "Internal combustion engines." March 5.
4707.—Dickson, W. K. L., "Incandescent gas-mantles." March 5.
4712.—Smith, F. H., "Gas and oil engines." March 5.
4715.—Johnson, J. Y., "Apparatus for piling coal." A communication from the Dodge Coal Storage Company. March 5.
4730.—Best, R. H., "Pendant and other lamps." March 6.
4746.—Moss, R. J., "Generation of acetylene gas." March 6.
4792.—Harris, I. L., "Acetylene gas-generators." March 6.
4885.—Kaeferle, F., "Pressure reducing apparatus." March 7.
4891.—Pittler, W. von, "Gas-stoves." March 7.
4915.—Rauthmell, T., "Generating acetylene gas." March 8.
4951.—Keller, H., and Knappich, J., "Acetylene gas-generators." March 8.
4954.—Cook, E. R., and Heusner, G. F., "Acetylene gas machines." March 8.
4962.—Stuart, C. E., jun., and Allsopp, W., "Acetylene generators." March 8.

CORRESPONDENCE.

[*We are not responsible for opinions expressed by correspondents.*]

Incandescent Gas-Burners in Public Lamps.

Sir,—I am surprised that Mr. Foulger should have thought fit to so deliberately misrepresent the remarks I made at Manchester on the lighting of incandescent street-lamps; but I can understand that he finds the success of the ladder system in Bradford and elsewhere "no laughing matter."

I have never advocated the use of distorted or broken mantles; and we certainly never retain them in the state suggested by Mr. Foulger. On the contrary, we are often complimented on their efficiency.

However, all gas managers who are anxious to obtain the best lighting results, and not merely to sell as much gas as possible, must determine for themselves which method to adopt. I can only repeat that our experience in Bradford (which in this matter is somewhat extensive) has proved the ladder system to be unquestionably the best.

Bradford, March 15, 1901. Chas. Wood.

Developing the Gas Business.

Sir,—I have read with considerable interest the series of articles on "Business Sketches in America," by Mr. E. W. T. Richmond, which have recently appeared in the "Journal."

We may not all agree with the necessity for the extensive advertisements adopted by some companies on the other side of the Atlantic; still, it must be admitted that the results achieved at Trenton are remarkable, especially when one takes into consideration the price of coal.

I think a very great deal may be done in cultivating business, by a liberal amount of advertising in local papers, with personal canvass and occasional cookery lectures. It is very necessary that consumers should be treated generously in the way of fixing stoves free of charge, with low rental, and selling at cost price and fixing free. Until the present time, my Company have not advertised; and I find that, although gas exhibitions have been held annually for the past five years, many of the residents are ignorant of the terms on which the Company hire and sell stoves. Hence the necessity for circulating as widely as possible information giving the terms of hire and purchase, and illustrating the advantages of gas-cookers, &c.

As a result of the articles mentioned, we have decided to advertise extensively in the local papers. Last year, a small village which was already supplied with gas was added to our district. The number of consumers was 37. Cookery lectures were given, and the consumers canvassed, the result being that 25 ordinary stoves were ordered, and the consumption of gas was practically doubled during the year.

Tonbridge, March 15, 1901. James Donaldson.

Oil Gas in India.

Sir,—I have read Mr. George Cecil's article, *re* "Gas: Its Uses in India," in the last number of the "Journal," and have been amused thereby. Enclosed is an account of a small, but successful, venture in the way of oil-gas lighting which might possibly interest you. Acetylene does not seem to flourish in India, in spite of the low first cost of plant. Oil gas with Bray's 000 and 0000 burners, or with Welsbach, Kern, or Sugg's incandescent burners, gives perfect results. The low cost of oil in India and cheap labour are all in favour of oil gas.

Moorgate Street Chambers,
London, E.C., March 13, 1901. Edwin A. Mansfield.

[Enclosure.]

MANSFIELD'S OIL GAS IN MOULMEIN.

[From the "Moulmein Advertiser," Jan. 15, 1901.]

Nearly three years have elapsed since the streets of Moulmein were first illuminated with Mansfield's oil gas, and during that period the light has been burning with unfailing regularity. When the question of adopting gas was decided by the Municipal Committee, there were a number of opponents to the scheme, who were aware that the lighting-rate did not cover the cost of the old system of kerosene lamps, and doubted the assurances that the tax would not be increased for improved lighting. Three years' experience has demonstrated that, although the gaslight is three times as effective as the discarded kerosene lamps, the working expenses are much less; and last year was the first time in the history of Moulmein that the lighting-tax had met the cost, and it was not necessary to borrow from other funds. Messrs. Mansfield and Sons guaranteed that the consumption of each burner would not exceed 2 cubic feet per hour. The consumption has never been more than 1¼ cubic feet, or 25 per cent. less than the guarantee.

Emboldened by the success of the public lights, private consumers gradually began to send in applications for connections. These have proved so successful that applications have latterly poured into the Municipal Office, much to the discomfiture of the Municipal Engineer, who cannot cope with them when his resources are so limited. A third gasholder and two producers were added last year, but the capacity of the increased plant has already been exceeded considerably. At present, in addition to the 251 public lamps, more than 700 private lights have been connected; and it will be necessary to increase the generating plant before more lights can be provided for. The following figures will show how rapidly the private consumption is increasing: August, 17,900 cubic feet; September, 19,400 cubic feet; October, 27,900 cubic feet; November, 41,700 cubic feet; December, 62,100 cubic feet. The success of the undertaking is so evident, that the worst opponents have been converted, and have joined the long list of applicants for their houses to be connected. The Municipal Committee are to be congratulated on the success of their enterprise.

It appears that in the Furness district of the iron and steel trade depression is being keenly felt, particularly by the Furness Railway Company. This industry forms the backbone of the Company's business, and the result of the depression has been a considerable falling off in their revenue. The goods and mineral traffic alone show a decrease of 136,340 tons and of £6831 in money.

PARLIAMENTARY INTELLIGENCE.

HOUSE OF LORDS.

The following further progress has been made with Bills:—

Bills read a second time: Alfreton Gas Bill, Dover Gas Bill, Harpenden District Gas Bill, Otley Gas Bill, Sutton-in-Ashfield Urban District Water Bill.

The Dover Corporation Bill, Omagh Gas Bill, Poulton-le-Fylde Gas Bill, Prestatyn Water Bill, Salford Corporation Bill, and Sheffield Corporation Bill have been referred to a Select Committee; consisting of Lord Newton (Chairman), the Earl of Lathom, Viscount Falmouth, Lord Sinclair, and Lord Muncaster; to meet on Tuesday, March 19.

The Aspatria, Silloth, and District Water Bill and the Handsworth Urban District Council Bill have been referred to a Select Committee, consisting of Lord Stanmore (Chairman), the Earl of Scarborough, the Earl of Carlisle, Lord Monteagle of Brandon, and Lord Northbourne; to meet on Wednesday, March 20.

Petitions have been presented against the following Bills: Chester Gas Bill, Elland Gas Bill, Harrogate Water Bill, Newport (Isle of Wight) Gas Bill, South Essex Water Bill, Wisbech Water Bill.

The promoters of the Stratton and Bude Gas Bill have decided not to proceed with the measure.

HOUSE OF COMMONS.

Tuesday, March 12.

WOLVERHAMPTON CORPORATION WATER BILL.

On the motion for the second reading of this Bill,

Mr. A. Brown moved, as an amendment, that the Bill be read a second time that day six months. He said Wolverhampton had already ample means of getting what further water it required under the Act embodying the Birmingham water scheme; and it could be done more quickly and cheaply than under the present Bill. The interests of the landowners and large proprietors in Shropshire would be seriously damaged by the proposed water-works.

Mr. Leighton, in seconding the amendment, said the Bill was one to enable the ratepayers of Wolverhampton to make a profit out of the water, to the ruin of the districts from which the supply was obtained. The Bill introduced new principles contrary to public policy.

Sir H. Fowler said the object of the Bill was to increase the supply of water available for the large manufacturing and commercial population of Wolverhampton and its neighbourhood. There were now 115,000 persons, besides large manufactories and breweries, within the limits of the borough unsupplied with water; and therefore the Corporation were obliged to take steps to increase the supply. The scheme interfered with a purely rural district containing a population of about 13,000 people. The Corporation recognizing their obligation to the residents in the locality whose water it might be said they proposed to take, would willingly accept the decision of a Committee to whom they trusted the Bill would be referred.

Colonel Kenyon-Slaney impugned the consistency of the right honourable gentleman. When the Parish Councils Bill was passing through the House, he said these Councils would be able to utilize any water supply in their parish. As a matter of fact, every Parish and District Council, and every single person holding a public office in the area affected, objected most absolutely to the taking away from them of powers which had been conferred upon them by Parliament.

Sir H. Fowler pointed out that the Bill contained a clause which provided that the Corporation must sell the plant and works to any local authority desiring to acquire them.

Colonel Kenyon-Slaney remarked that it would be just as possible for a Parish Council to buy up the plant and works as it was for him to buy out one of the large Wolverhampton concerns. The Wolverhampton Corporation had sunk a well more than 900 feet deep; and the result in the neighbourhood had been disastrous. His own estate had been deprived of water; and when he sought a personal interview with the officials of the Corporation, they simply said they had taken his water, and if he found any more they would appropriate it without giving him any compensation. But he was not the only sufferer. His neighbours for miles were exactly in the same position as he was, and were threatened with the same cruel misfortune. They came, through him, to ask the protection of the House. With regard to the rural districts getting a supply of water, their prospects under the Bill were very hazy. He was at a loss to know why the Corporation should be allowed to go over the border of Staffordshire and take from Shropshire, 12 miles away, the water which the people in that county wanted for themselves. Wolverhampton's need had been established; but it had not been proved that the need could not be better supplied from another source than the one now proposed, which was only temporary. Wolverhampton would, indeed, do better to go to the inexhaustible uplands of Wales.

Mr. Chamberlain said his honourable and gallant friend had indicated the general danger which was involved in Bills like the one before the House. The material interest of the Corporation of Birmingham was against the Bill. When the Corporation undertook to bring water from Wales, they also undertook to supply the places on the route at cost price. Therefore the Corporation would feel some disappointment if Wolverhampton did not avail itself of the supply. But when self-government was given to a locality, interference with its administration ought to cease, unless it was to protect some outside interest. If Wolverhampton refused to take its water supply from Birmingham, Birmingham had nothing to say. As to the local authorities concerned in the present case, the fact that they were opposed to the Bill ought not to be conclusive against it. Great towns must have a water supply, and they could not get it within their own area. But, on the other hand, nothing could be more unjust than that such action as that which had been attributed to Wolverhampton should be permitted. Anyone in such a position as his honourable and gallant friend would feel that he had been subjected to an intolerable grievance. Such action could not be defended, and ought not to be permitted. The principle to be laid down was that the localities affected should not be injured, and that all the water that the central authority could be allowed to take should be the surplus. It should be bound first to supply to the localities concerned all the water they needed at a reasonable price. His own opinion was that the Bill should be sent to a Committee with the express opinion of the House that in no case should the outside districts be damnified. In the Bill as it stood, there was no protection for them. But it could be inserted in Committee; and the interests opposed to the Bill could combine, so that the cost to each authority would be very small. He hoped the House would not allow the prejudice, suspicion, and irritation caused by the past conduct of Wolverhampton to interfere with what was essential to the prosperity of every large town, and would send the Bill to a Committee.

Sir A. Hickman pointed out that the objections which had been raised against the Bill could be threshed out in Committee, and urged that the House should not interfere with the ordinary course of a Bill of this kind, especially after the pledge the Corporation had given that they were prepared to furnish water to every person whose supply was interfered with, on such terms as the Committee might consider fair and reasonable.

The House divided, and the numbers were: For the second reading, 154; against it, 239—majority against, 85 The Bill was therefore rejected.

Thursday, March 14.

GASLIGHT AND COKE COMPANY BILL.

On the motion for the second reading of this Bill,

Mr. Lough moved, as an amendment, that the second reading be put off for six months. He said a Committee of the House which sat two years ago made certain recommendations which were to be carried out before any more capital was to be granted; and yet none of the recommendations had been carried out in the present Bill, although they had been accepted by the South Metropolitan Gas Company. The Gaslight and Coke Company charged 3s. 5d. per 1000 cubic feet for gas, as compared with 2s. 8d. charged by the South Metropolitan Company, and each extra 1d. represented a charge of £80,000 a year on the people living in a particular part of London. There was no immediate necessity for the Bill. The Bill sought to raise further capital for the Company, who only required £200,000 each year to carry on their undertaking. But the last balance-sheet showed that there was nearly £700,000 to their credit; while they had the permission of the House to issue £280,000 of capital, of which they had not availed themselves. Moreover they had the means of obtaining £900,000 by the sale of their large area on the south side of the Thames to the South Metropolitan Company. A similar Bill had been twice rejected—once by a Committee of the House of Lords, and a second time by a Committee of this House; and he asked the House not to put the Local Authorities of the Metropolis to the trouble and expense of opposing the Bill a third time. The Bill was opposed by the Corporation of London, the London County Council, and all the Local Authorities in the area affected. The Company had given the House more trouble than any other private trading concern in the country. The principal recommendations of the Committee of 1899 were that, before any fresh issue of capital was sanctioned, a new sliding-scale should be adopted, so that the consumers should get greater benefits than they obtained at present; that there should be an improved arrangement for the supply of slot meters throughout the Company's area; and that steps should be taken to redeem and get rid of a great deal of useless and unproductive capital, which had been brought forward in the accounts during the last twenty years, and on which a dividend of 12 per cent. had been paid at the cost of the ratepayers of London. Poor people suffered most through the action of the Company. At present the average amount which consumers with slot meters paid for gas was £2 16s. per meter per annum; but if a fair price were charged, each of these consumers, of whom there were about 120,000, would save from 16s. to 18s. per annum.

Mr. A. Gibbs seconded the amendment. He pointed out that the only attempt made in the Bill to meet the recommendations of the Committee of 1899 was in the redemption clause; and he was sure the House would agree that this clause was utterly perfunctory and unsatisfactory.

Mr. Cripps urged that, as a matter of business, there was no reason why the Bill should not be read a second time, in order that it might be properly discussed by a Committee. It was undoubtedly the fact that the Company wanted fresh capital; and it was in the interest of all parties that this capital should be raised in the most inexpensive way. The reason why two years ago a Bill was thrown out by a Committee of the House of Lords was because the time was inopportune, for Sir James Rankin's Committee had not then issued their report. The second Bill failed because its terms were not in accordance with the recommendations of the report. In the present Bill, however, the capital asked for had been considerably reduced. As to the questions of the sliding-scale and the charge for slot meters, there would be an opportunity of dealing with them if the Bill were allowed to go before a Committee.

Mr. Buxton characterized the Bill as one of the most impudent proposals within his recollection. Two Committees of this House and one of the other House had practically decided against the provisions of the Bill. Out of the five recommendations made to them, the Company had merely adopted the one which was of the least possible benefit to the consumers.

Mr. Gray also opposed the motion. He said it was flouting the House for a private Company to come there against the united wishes of all the Local Authorities and ask Parliament to pass their proposals. He appealed to the House to protect the consumers.

Mr. Burns objected to the Local Authorities of London being put to the unjustifiable expense of opposing the Bill. He pointed out that the promoters of the measure now charged 3s. 5d. per 1000 cubic feet for gas, while the price of the Company on the south side of the Thames was 9d. less. He believed the higher figure to be quite indefensible.

Mr. COHEN said that in his view the principal question involved in the measure was the authority of the House of Commons. It would be subversive of that authority if private companies were permitted to disregard the recommendations of Select Committees as the promoters of the Bill before them had done. The Company must be taught to show reasonable obedience to the House, and be required to do justice to the consumers.

Mr. G. BALFOUR held that the question was whether the Bill was or was not substantially the same as the two previous Bills. Five recommendations were made by the Select Committee of 1899, and of these it could hardly be pretended that the Company had acceded to more than one. Notwithstanding what had been said by the honourable and learned member for Stretford (Mr. Cripps), he had reluctantly, and much against his will—because it was a most unusual thing to recommend the House to throw out a Bill at the second reading stage—come to the conclusion that the Bill ought not to be read a second time.

Mr. CRIPPS said that, in view of the opinions expressed, he was authorized by the promoters to ask leave to withdraw the Bill.

The Bill was then, by leave, withdrawn.

The following further progress has been made with Bills:—

Bills read a second time and committed: Burgess Hill Water Bill, Devonport Gas and Coke Bill, West Surrey Water Bill.

The Hartlepools Gas and Water Transfer Bill, Heckmondwike Gas (Transfer) Bill, Tees Valley Water Board Bill, Wells Corporation Water Bill, and Wells Water Bill, have been referred to a Select Committee, consisting of Mr. Schwann (Chairman), Lord Balcarres, Mr. Carlile, Dr. Macnamara, and Mr. Bonham-Carter (Referee); to meet on Thursday, March 21.

Petitions in favour of the London Water (Purchase) Bill and the Metropolitan Water Companies (Amendment of Acts) Bill have been presented from the Battersea Borough Council.

LEGAL INTELLIGENCE.

Gas Company's Servant Stealing from Prepayment Meters.

At the Colwyn Bay Police Court last Thursday, John Chaplin, a gas-fitter, pleaded guilty to stealing two sums of money amounting to £9 9s. 9d. which he had extracted from two prepayment gas-meters. It appears the prisoner had been in the employ of the Gas Company for about four years, and was a trusted servant, receiving good wages. Mr. Earp, the Chairman of the Company, stated that prisoner was not authorized to collect the money from the meters, and did so while examining them. There were no definite instructions given to customers as to who was to take the money from the machines. The Magistrates said they were sorry to see the prisoner in such a position; but he must go to gaol for one month.

Appropriating Electric Current.

At the Leyton Police Court last Saturday, a local hosier was charged with helping himself to a supply of electricity. His lighting arrangements having broken down, he made a connection with the cable of the District Council. At the hearing, he naively explained that he "found he got a light, but did not see how he obtained it." "You were helping yourself to the Council's electricity without paying for it," remarked the Magistrate. Defendant said he did not mean to do that. He was nevertheless fined £5 and costs.

St. Helens Water Supply.—In presenting his yearly estimates at the meeting of the Water Committee of the St. Helens Corporation last Wednesday, the Borough Treasurer (Mr. J. Brown) said that during the past year the Committee's finances had worked out more satisfactorily than was anticipated; there being a profit of £197, instead of the expected loss. The principal feature was the meter supply, which had gone up from the estimated amount of £9500 to £11,200; while there was an increase of £200 on the estimate in regard to the house supply. He did not propose to materially alter the estimate for the ensuing year, and suggested that the present charges—4¾d. per 1000 gallons for domestic, and 5d. for trade supplies—should remain in force.

An Irish View of the Penny-in-the-Slot System.—The inhabitants of the Emerald Isle are apt to take distorted views of many ordinary things; and it is therefore not surprising to find a writer in the "Freeman's Journal" making himself ridiculous over the prepayment system of gas supply. The issue of that paper for the 2nd inst. contained the following remarks: "When the much-discussed new coinage finally appears, a very large proportion of the copper issue will pass directly into the hands of the gas companies. The penny-in-the-slot arrangement of supplying gas, which is so economical and convenient, has just one drawback—that light coins give a smaller pennyworth than heavy ones. The newer the penny the bigger the pennyworth; therefore, the first influx of King Edward's coins will be regarded as a boon by penny-in-the-slot consumers and utilized accordingly. It is a fact worthy of comment that gas companies in general object to fit the slot arrangement except in artisans' houses; preferring the meter system for the well-to-do. There is certainly food for thought in this state of affairs." And we may add: Much work also for the schoolmaster. The paragraph furnishes an excellent illustration of the want of knowledge on technical matters displayed by writers for the Press, to which frequent reference has been made in the "JOURNAL." Of course, it was not to be expected that Mr. F. T. Cotton, the Secretary of the Alliance and Dublin Consumers' Gas Company, would allow such an erroneous statement as the one contained in the paragraph to go uncontradicted. He promptly pointed out, in a letter to the Editor of the paper in which it appeared, that the weight of the coin has nothing to do with the quantity of gas supplied. The consumer pays on the register of the meter, and gets a pennyworth of gas, be the penny light or heavy. He adds: "Were your statements correct, it would be nothing short of practising fraud on the consumer."

MISCELLANEOUS NEWS.

OSSETT GAS ARBITRATION.

SURVEYORS' INSTITUTION, WESTMINSTER—Tuesday, March 5.

(*Before Mr.* F. PUNCHARD, of Kirby Lonsdale, *Umpire.*)

The arbitration to fix the price to be paid by the Ossett Corporation to the Ossett Gas Company for the compulsory acquisition of their undertaking under an Act of 1900, was continued this day. Mr. CORBET WOODALL was Arbitrator for the Company; Mr. JOHN MONKHOUSE, Chairman of the Gas, Water, and Electricity Committee of the Kendal Corporation, for the Corporation.

Mr. BALFOUR BROWNE, K.C., and Mr. R. P. BLENNERHASSETT, K.C., appeared for the Corporation; Mr. CLAUDE BAGGALLAY, K.C., and Mr. HONORATUS LLOYD for the Company.

At the conclusion of the case for the Company, as reported last week, p. 694,

Mr. BALFOUR BROWNE, on behalf of the Corporation of Ossett, said this was a gripping, grasping, miserly Company; and he did not believe there was a soul in the district who would mourn its death. However, it was consistent, and up to the last, under the guidance of Mr. Stevenson, was proving true to its old traditions of getting as much as it possibly could. Everywhere the Company bled the consumers to the best of their ability; and yet they asked to be treated as the best Company who ever existed. They had power to borrow £3000. They converted this into share capital, although, according to their own balance-sheet, they had been able to borrow at other times at 3½ per cent. At 3½ per cent., the burden on the consumers would have been £105. As they raised the money at 10 per cent., the burden had been £300, or a difference of £195; and they now asked the Court to capitalize this figure, roundly £200, at 30 years' purchase—£6000. Was he not right in saying the Company were grasping? The whole idea of allowing people to borrow money was that it should be done as cheaply as possible; and it was a very great advantage to consumers that, when capital was expended in works, it should bear as little dividend as possible. Listening to Mr. Baggallay and Mr. Stevenson, one would have thought that the public of Ossett had been created for the benefit of the Company, which he thought was a mistake. Then they had the right to raise their last capital at 7 or at 6 per cent. It would have been to the benefit of the consumers—and they could have done it, as this was a well-found Company—to have raised it at 6 per cent. But they did it at 7 per cent.—again 1 per cent. upon the whole £28,000 out of the consumers' pockets. He did not say the conversion was illegal. But it was wrong to screw the last farthing out of the consumers—to use the statutory powers up to the hilt; and it was because companies had done this that the backs of consumers had been set up, and corporations had been forced to purchase. Now he came to the illegal acts. The Company had paid, quite improperly, the income-tax to their shareholders. That came out of the pockets of the consumers; and the last ten years it had amounted to £1056. It was absolute robbery. Had a Company going on like this a long life? Did the Court think such a Company secure? There never was a more insecure Company than this one, who had so grossly failed in their duties to the consumers. With a blatant cynicism only seen in some gas engineers, Mr. Stevenson said it was better to go on allowing gas to be wasted than to stop leaks; but he (Mr. Balfour Browne) protested strongly against that. The Court would have to consider: Were the Company using their powers and discretion properly or merely for the interests of the shareholders? He said: Simply for the interests of the shareholders; and he asked the Court to say it was not well secured. The Company had been robbing the consumers and spending a large amount obtained from them, which had increased the value of the works from £48,000 to £63,000, according to Mr. Stevenson, or £56,000, as the Corporation witnesses said. The increase had come from the consumers' pockets, because they had no right to charge so high a price for gas. They had been taking money they could not divide, and slinking away with it into the works. They were paying 10 and 7 per cent. dividends, derived from the consumer, on money spent unnecessarily on land and works which had been bought too soon. They had not spent sufficient on repairs and maintenance of mains and works in the account year. In that year—the year ending at December, 1899—they did not earn the maximum dividend; and he did not need to prove that statement, because Mr. Beevers, in his report to the Quarter Sessions, found absolutely as a fact that they had not been paying dividend out of revenue earned, but out of reserve. The amount they spent on maintenance of works and services was 3·17d. This was inadequate; it should be 5d. In that year, upon their own revenue account properly adjusted, they did not earn sufficient to pay the maximum dividend by £71. That was so little short of £3460—the full maximum dividend—that he should not say this sum ought not to be taken to commence with. But they would have to consider how it was secured. He thought the security bad. The town was not progressing with great rapidity; and they heard from Mr. Cash that the introduction of the electric light in Brighton enormously reduced the consumption of gas for some years, and the corresponding reduction here the Corporation would have to stand the racket of. They also had to stand the racket of losing nearly £1000 a year from the one consumer who would be the electric light purveyor—the Corporation of Ossett. Was this Company like Consols, as Mr. Cash suggested? No gas company was worth 30 years' purchase; and here the figure should be considerably lower. As to the 10 per cent. allowance, he objected to it altogether. In the Houses of Parliament, the Company were willing sellers—the whole question between them being one of price; and he referred at length to the correspondence and proceedings before the Select Committee in support of this contention. The provision in the Local Act, that the price, failing agreement, should be determined "in accordance with the provisions of the Lands Clauses Act," meant that the machinery that was to determine the price or consideration, failing agreement, was to be

found in the Lands Clauses Act. There was not one word about compensation in the section; nothing more than price or consideration was meant. The Lands Clauses Act did not give 10 per cent.; and Mr. Baggallay had fairly and honestly said so. He said it had become a practice to give it. But practice would not rule this Court; they would not give 10 per cent. in addition to the full value. If the claimants had wanted to get the 10 per cent.—£10,600—if they had wanted to make it perfectly certain, they should have inserted a clause for the purpose. Mr. Baggallay, in reference to the 10 per cent., said the shareholders were being compelled to change their investments. That had been done by Act of Parliament; and there was no compensation because the Legislature thought it necessary to pass an Act. Then he said there was risk in changing; but there was none, because that had all been considered in the multiplier. He also said there was loss of income until the money was distributed; but that must be a mere triviality. Then he said there was loss of income until the money was re-invested. But the Corporation had given them half the reserve fund (£2000), which would cover every one of these cases, and £225 for winding up. Where the 10 per cent. was to be allowed, it was made perfectly clear, as in the Skipton case, where the clause stated: "In the event of arbitration, the arbitrators and umpire shall . . . . allow 10 per cent. as for compulsory purchase," &c. Here there was no such provision; and he therefore said that, having arrived at the full price or consideration, they should not give a bonus out of the pockets of the consumers of gas in addition.

Mr. *R. T. Heselton*, Accountant, of Bradford, handed in tables relating to the accounts of the Company for years ending June 30, similar to those prepared by Messrs. Lass, Wood, and Drew on the other side; and he explained how the two sets differed.

Wednesday, March 6.

Mr. *Heselton* was cross-examined by Mr. LLOYD with regard to details in his tables which differed from those of Messrs. Lass and Co.

Mr. *Frederick Audsley*, Chairman of the Gas Purchase Committee of the Ossett Town Council, examined by Mr. BLENNERHASSETT, said he had taken an active part in the movement, which commenced about six years ago, to secure the gas undertaking. The growth of the town had not been rapid. The woollen manufacture, which used to be the staple industry, had declined; now the principal industries were the merino and mungo and colliery trades. The two former chiefly employed women and children. In the absence of any new industry, he saw little prospect of increase or development, and no prospect of a large increase in the demand for gas. During the last ten years, the Corporation had widened a number of streets, which had led to some prosperity, and facilitated the building of cottages; but for the past eighteen months building had almost stopped, the supply of houses being more than equal to the demand. The Corporation were making a loss on the water supply, which was derived from the Dewsbury and Heckmondwike Water Board; and the rates on the town were 7s. in the pound. Horbury had been rather more progressive than Ossett proportionately; but the population and rateable value had not increased to any great extent. The Horbury Council had not yet obtained an Electric Lighting Order; but several firms there had put down plant. The adoption of the electric light in these factories was likely to seriously diminish the demand for gas in future. In Ossett they had an Order, which would have been put in force before now but for the gas question. It was therefore not reasonable to say that the position of the Company as regards the payment of maximum dividends was absolutely secure. He considered it was very precarious. For a number of years past there had been serious complaints in Ossett with regard to the management of the Gas Company; and combinations had been formed of all the public bodies to request the Company to give a better quality of gas, and to reduce the price. Complaints of this nature had been pretty constant since 1870. It had been a bye-word that Ossett had the worst gas of all the surrounding districts. For years the Corporation had been asking the Company to lay mains; and they had to make repeated requests, extending over a long period, before the Company did the work. The present price of gas in Ossett compared unfavourably with the charges in other neighbouring towns. Batley charged 2s. 3d. per 1000 cubic feet, Horley 2s. 4d., Barnsley 2s. 6d., Wakefield 2s. 6d., Halifax 2s. 2d., and Heckmondwike 2s. 6d.; and these towns gave a reduction for motive power, which was not granted in Ossett. There was no reason why gas should not be as cheap in Ossett. In 1882, the price was 2s. 6d. per 1000 cubic feet; and it had never been as low since, owing to the Company issuing shares at par among the proprietors. Gas stock in the Wakefield and Mirfield Companies sold to yield 4¼ per cent., and both Companies were under the standard-price arrangement. A list of the sales by auction of shares in the Ossett Gas Company showed that they increased in value, in consequence of the purchase movement, fully 30s. per share; and the price was also enhanced by the prospect of an allotment of shares at par. From 1890 to 1897 (the period before the agitation), the shares sold to produce 4 per cent.; 233 10 per cent. shares realizing, on the average, £12 13s. 6d. each, and 617 7 per cent. shares £8 14s. each. The full value of the shares, in the absence of agitation and the prospect of allotment, was £12 and £8 respectively.

Cross-examined by Mr. LLOYD: The complaints bore on the value of the Company, because they had built up their present position by supplying inferior gas at a high price. They claimed four or five years' extra purchase because they had placed themselves in a good position by obtaining money from the public in an irregular way The Company had paid maximum dividends; but from what source he was not prepared to say. They paid back-dividends, in his opinion, out of capital. That was a great wrong, and was another reason why the multiplier should be smaller. They had also used revenue on capital account, instead of raising a loan; and had thus kept the price high. In 1897 and 1898, they spent about £2000 on what they called capital account; but they had no capital.

Mr. CORBET WOODALL: But do you not see from the accounts that the simple effect is to increase the adverse balance on the Company's sheets?

Witness: I see they add it on paper.

Mr. CORBET WOODALL: I have no patience with evidence of that sort being brought forward when the Corporation have had the advantage of a capable Accountant who has gone through the books.

Witness: It is what has been going on.

Further cross-examined by Mr. LLOYD, who asked if he suggested that there had been sales of the shares locally with a view of puffing the Company's stock for the purpose of sale, witness said there had been sales at which there were three Directors present running up prices. Ossett stock he agreed returned about 3½ per cent.; but that was on the puffed-up quotation. The Company were bound to supply 14-candle power gas; but he had never ascertained what was the power of the gas. People could scarcely read or work by it. The Electric Lighting Order was obtained in 1898.

Mr. LLOYD: Have you done anything with it?

Witness: We have viewed different places to ascertain the best means of adopting it—the best methods. We have suspended it till we got this gas question settled, so that we could devote our whole time to it. We intend putting it in force. We have in mind two or three sites for a generating station. The two years which we have been given for the construction of the works have expired, and we have done nothing; and therefore we are liable to have it revoked.

Re-examined by Mr. BLENNERHASSETT: He knew of no instance in which the Board of Trade had revoked an Order.

By Mr. CORBET WOODALL: In his opinion, the Company had not fulfilled the obligations imposed upon them by their Act.

Mr. CORBET WOODALL: Whose duty is it to see that the Act is put into force?

Witness: If you want me to answer that, I say the Corporation have been dictated to, and the Local Board, too, by the directorate, to a large extent.

Have you appointed an Inspector to see what is the quality of the gas supplied?—We had an Inspector of public lamps; and he reported from time to time that we were not getting within a third of what we paid for.

Have you appointed an Inspector?—Not to test the quality at the works.

Mr. *Arthur Silverthorne* said that in the recent Bill of the Company, they sought power to raise £50,000 additional capital, which they said was not an answer to the Corporation proposal to purchase, but because, in extending the business, it had become necessary. He agreed that for some purpose further capital was required. He had examined the works, and, generally speaking, was not greatly opposed to any of the statements that there was excess there. He put their potential capacity at 600,000 cubic feet; but undoubtedly there were some portions to which a larger figure might be applied. He thought the aim of the Company was to reach a potential capacity of 720,000 cubic feet. In some portions they almost achieved it; but in the most material of all—the retort-house and benches—they did not, and he considered they were now nearly at the point of exhaustion as regarded this particular part. When the Corporation possessed the works, they would soon have to enlarge the productive capacity. He did not think there could be any question whatever as to the way in which the undertaking should be valued. It could only be valued upon the maximum dividends. The purchase-money should be an amount which, if invested in securities of the same class, would give the same income. Therefore the price at the present time of similar securities was a vital element in the case. At first non-statutory undertakings were valued at 16⅜ years' purchase; and then, when it was found that local authorities could not promote competing schemes, the figure rose to 20 years' purchase. This, however, had nothing to do with the intrinsic value of the concerns, but was simply a question of security. There had been no increase in the case of statutory gas companies, because the same reason did not apply. It was rather the reverse, as statutory gas companies were exposed in the forefront of the rising competition through electric light and other things, and there was no possible ground for their being increased in value. Moreover, in the early seventies there was a large number of companies who did not pay maximum dividends; and all these were valued upon maintainable profits simply. Of course, such companies were not entitled to 20 years' purchase. They could also claim for excess of plant, or the reverse. The maximum-dividend company could not do this. He did not believe there was between the two—the 20 years paid on the one hand, and 22½, 24, or 25 on the other—a pin's head difference. The yield was practically the same. The Bank rate was unquestionably a leading factor in the value of gas undertakings. In the cases that he had referred to, the Bank rate was higher than it was now. It was a period in which cheap money was beginning to dawn; and from the seventies up to lately the era of cheap money practically obtained. But it had now passed away. So far as the value of money was concerned, the conditions now were somewhat similar to those when the Belfast Gas-Works were bought for 22½ years' purchase. He had applied these principles to the Ossett Gas Company. The capital £15,000 at 10 per cent. gave £1500 a year interest; and £28,000 at 7 per cent. gave £1960, which brought in £3460 dividend. From this had to be deducted £245 interest on loans of £7000. The Company should receive £225 upon the £15,000 10 per cent. stock, which was £33,750, and £157 10s. on the £28,000 at 7 per cent., which was £44,100. This made a total value for the undertaking of £77,850, which was a valuation practically upon 22½ years' purchase. He thought, considering the present value of money, this would be the proper price. He had prepared some tables showing the value of gas stock prior to and after the advance in the Bank rate. Before the rise, the yield to the investor was about 4 per cent., corresponding to 25 years' purchase. And since the Bank rate advanced in October, 1899, there had been a very considerable increase in the yield, and a decrease in the number of years' purchase. About 22½ years seemed to be the ruling figure now. The result of his table showed that if the Ossett undertaking was bought out at his valuation, the shareholders would be able to reinvest their money in securities of the same kind giving them practically the same income. He should say they had before them fully ten or fifteen years of dear money; and it was impossible to continue valuing undertakings at a rate which was only associated with cheap money. He was a 25 years' purchase man. He would value this Company at 25 years' purchase; and he had given evidence of the fact by offering, in October, 1899, that very sum. But since the revelations—the difficulties now confronting public bodies

in obtaining money—he considered the time would come when they must face this trouble and alter the method of procedure He had prepared a statement analyzing the affairs of the Company in the years 1887, 1891, and 1899, ending in each case in December. In determining the maintainable dividend of the Company, the accounts after December, 1899, should not be admitted. The price of coal for the value of residuals fluctuated, and caused the later accounts to assume an aspect inconsistent with the normal condition of things. The accounts during the last two years showed an increasing rate of profit; but that was not the normal rate which the Company was capable of producing, or had been habitually producing. The cost of making gas was unduly low in Ossett. It was 1s. 6½d.; but very probably it would have to be raised to 2s. The profit in 1899, according to Mr. Heselton, was £4132, from which there had to be deducted £245 for interest on the loan; and then an adjustment was necessary to bring the repairs and maintenance, which were unduly low, up to the normal. This item should be 5½d. per 1000 cubic feet, which would mean another deduction of £687. These deductions would bring the income below the maximum profit by about £100. The usual figure to take for repairs and maintenance was 5d. Here he had taken 5½d., because coal had risen, and all other charges would rise in sympathy. He also handed in tables showing the great difference between the figures claimed, and the compensation awarded, in the case of the transfer of a number of statutory and non-statutory companies. Exorbitant claims had been made; and the very fact of making them had no doubt influence upon some tribunals. He had never heard of 30 years' purchase being awarded. The adjustments which he suggested in the accounts showed that the income was not secured in the way represented by the other side. There was no warrant for saying a sliding-scale company was worth less than a maximum-dividend company. If there was any difference at all, it was the other way; the extra dividend which the former could pay would give it a greater value. The prospect of the introduction of electric light would be competition; and it unquestionably assailed the prospects of an unrestricted course of prosperity. His own faith in gas, however, was such that he did not think it could do any great injury.

Cross-examined by Mr. BAGGALLAY: He had never before had occasion to bring forward the matter of money value. In previous cases the normal state of things prevailed. The difference in the value of a statutory and non-statutory company was usually about 5 years' purchase. The full productive capacity of the works, without any stand-by, was 537,000 cubic feet. He was certain that before long it would be necessary to increase the retort-benches and re-arrange them. This would be because the maximum make of gas would increase very considerably beyond what it was at the present time. He looked forward to an increase, or he should not have advised his clients to purchase. He anticipated that the 537,000 cubic feet capacity would very soon not be sufficient. The business through prepayment meters was only in its infancy; the Company had neglected it.

Mr. BAGGALLAY: You spoke about the value of non-statutory undertakings being, in 1870, something like 16¾ years'-purchase. I am not going back to this ancient history, because, to my mind, it has absolutely nothing whatever to do with the question. The question is: What is the value of the undertaking to-day? Assuming we are agreed that the maximum dividends in this case is the basis, the first thing you have to look to is, What is the nature of the security for the maintenance of sufficient profit to pay maximum dividends?

Witness: I consider gas is in the nature of a security of its own. If a purchase were compulsory, 10 per cent. on the value was the right allowance to make; but I deny that the sale here is compulsory.

Witness was closely questioned as to whether he had ever put a valuation in, in the form of the valuation here; and at length he said he did not think so—not in that precise form. But he had done so on the footing of years' purchase. He was also interrogated regarding his suggestion that insufficient had been spent on repairs and renewals; but he adhered to his figure of 5½d. A ridiculously small sum was spent on the mains; and the large amount of leakage showed that they were in bad condition. Whatever was expended to prevent this leakage, if it were successful, would have set against it the amount which would be saved by not having to manufacture the gas.

Mr. *Heselton*, recalled, put in accounts which had now been agreed between the accountants.

Mr. *F. W. Stevenson*, examined by Mr. BLENNERHASSETT, said the Ossett works were generally in good condition; but the retort-house was not. The retorts were on the old-fashioned direct-fired plan; and the make per ton in 1899 was some 9364 feet. This was very poor, and showed that the retorts had not been kept in good order. Taking the maximum day's make at 460,000 cubic feet, there was about 6 per cent. surplus in the retorts, after allowing a bed for contingencies. If the Corporation took over the works, they would no doubt have to spend money on the retorts. Leaving out retorts, the works, on an average, were equal to from 630,000 to 650,000 cubic feet daily. This indicated that the Company had spent far more capital than was necessary; and they had to pay dividend upon this capital. The leakage for 1899 was 16·48 per cent., which was partly accounted for by the excessive quantity of 2-inch mains. They were much more liable to fracture than larger ones; and they formed 36 per cent. of the whole of the mains. It would require considerable expenditure to reduce the leakage to a proper figure. There should not be any 2-inch mains which had to be drilled and tapped for service-pipes. The Corporation would have to bear the expense of replacing them; and this detracted considerably from the value of the works. His estimate of the structural value of the works was £55,954 (which included £2495 for cottages), or £807 per million cubic feet sold, which, considering the locality of the works, was very high. The rate of increase in the town had not been rapid; and the increase of the last five years was not maintained in 1900. There was always fear in mill districts, or wherever there were large consumers, that they might supply themselves with electric light. Mills often had surplus power; and for many mills electric light was better than gas. He should not, therefore, regard the Company as very safe. He held that the expenditure on repairs and maintenance had been too low. There was proof of this in the fact that the small make per ton showed that they did not keep the retorts in good order; and the high leakage indicated that the mains and services had not been properly maintained. The figure should be about 5d., instead of 3·17d. The expenditure on repairs and depreciation of meters also had been too little. The result of his adjustments was to make the available profit £3388; whereas the amount required to pay maximum dividends was £3460. He, however, took £3460 as the basis of his valuation, and, having regard to all the circumstances, capitalized it at 24 years' purchase, producing £83,040, which would give full compensation.

Cross-examined: If the Company incurred further expense in maintenance, they could raise the price again; but raising the price of gas invariably reduced the consumption. He assumed the Company would earn maximum dividends in perpetuity; but as there were certain deficiencies in the Company's conduct, he allowed a smaller number of years' purchase. If the income had been absolutely secure, he would not have allowed more than 25 years' purchase.

This closed the evidence.

Mr. BALFOUR BROWNE, for the Corporation, said the whole argument he put before the Court was that the income was not well secured, and that therefore the multiplier to be applied to that income should not be large, but small. It was agreed that the Corporation should give the Company a capital sum which would return them in a like security a similar income. The Company were to invest in gas stock; and gas stock must go down owing to the dearness of money. If thirty years was ever right, which he denied, it could not be the right figure now. A portion of the income was from cottages; and that was part of the maximum dividends. Clearly that was not secured so as to warrant even 24 years' purchase. He therefore urged that 22½ years, according to Mr. Silverthorne, or 24, according to Mr. Stevenson, was ample. With regard to the 10 per cent., he contended that most distinctly in this case there was an agreement to sell. They offered to sell in a letter; and further, when the Corporation promoted a compulsory purchase Bill, Mr. Baggallay came forward and said: "We will sell; these are the terms"—terms not put upon anybody by Parliament, but agreed between the parties. Surely that took it out of the category of a compulsory sale. He asked the Court to conclude that the Corporation fully valued the undertaking when they assessed it at £83,000, without any 10 per cent. allowance.

Mr. BAGGALLAY, in reply, said that Mr. Balfour Browne's strong language as to the Company being grasping and miserly was all irrelevant, if true; and he denied that it was true. He went on to refer at length to the proceedings before the Committee of Parliament, contending that they conclusively showed that the Lands Clauses Act was inserted in the Act, under which the present arbitration was held, with the object of securing the allowance for the sale being compulsory. Mr. Balfour Browne had said the Company acted immorally in converting the £3000 borrowed under the Act of 1852 into share capital. That was not only not illegal, but not immoral. There was no better known principle of law; and it was common sense that if the law did not say you were not to do a thing, you were entitled to do it. Here, the Companies Clauses Act said the conversion might be effected; so that it was expressly sanctioned. With regard to income-tax, he admitted that the Company had acted wrongly; but that did not affect the value of the undertaking. It only showed they were able to pay 8d. in the pound more than the 10 per cent. on their shares. It meant that they had a margin above the dividend they were declaring, which, if they had not divided it, would have been a security for the income of the Company, because they could have put it into the reserve fund or elsewhere, and then reduced the price of gas, and so obtained another 1d. or so margin by which to raise the price of gas again afterwards in case of difficulty. If the Company had done illegal things, why had not steps been taken to prevent them? The people of Ossett had their remedies; yet they never thought to enforce them. It was only when the idea of purchase occurred to them that they brought up the irregularity of the income-tax, and thus made a grievance with which to go to Parliament and ask to be allowed to expropriate the concern. Then it was said the surplus works meant surplus capital, and that this was to justify taking more from the consumers than they should do. The size of a particular works could not be adjusted to particular consumption. The answer to the criticism was supplied by Mr. Silverthorne, who said an expenditure would soon be required on the retorts, because the property was going to carry the Company to an increase very soon. Then Mr. Balfour Browne said Mr. Beever's report showed that the dividend was not earned. The report stated: "The maximum dividends have been paid during the last ten years, although not always earned; the deficiency being obtained from the reserve fund." But under section 31 of the Gas-Works Clauses Act, the reserve fund existed for that very purpose. It was said the Company had not spent enough on repairs. In every case they must deal with the facts as they found them; but he should not go into this matter. The short point of the whole thing was there had been this 45 years payment of maximum dividends, and the reserve fund was full, which was as much as the Company might do. As to the electric light, he was not afraid of it—believing that gas could, to a large extent, stand side by side with it. Mr. Silverthorne, one of the witnesses for the Corporation, who had heard all the evidence, in face of the probable introduction of the electric light, said the consumption of gas was going to increase; and if Mr. Silverthorne was right in this matter, Mr. Balfour Browne was wrong. Further, Mr. Silverthorne's statement proved the security of the concern, as to which Mr. Balfour Browne was doubtful. In conclusion, Counsel read correspondence which had passed relative to the proposal to purchase, which he urged did not support the contention, on behalf of the Corporation, that the Company were willing sellers.

The proceedings then terminated, the Umpire reserving his award.

Among the other subjects on the *agenda* for the annual meeting of the Association of Municipal Corporations at the Guildhall next Friday, is one referring to the coal supply. A representative of the Stockton-on-Tees Corporation will move: "That, in consequence of the recent exorbitant price of coal charged to domestic consumers, a considerable reduction is justifiable and necessary, more especially in view of the present market price of coal for export trade;" and he will ask for "a Bill to enable municipal authorities to provide a more efficient and economical system of coal supply to ratepayers."

SHEFFIELD UNITED GASLIGHT COMPANY.

The Ordinary General Meeting of this Company was held on Monday last week—Sir F. T. MAPPIN, Bart., M.P., in the chair.

The GENERAL MANAGER and SECRETARY (Mr. Hanbury Thomas) read the notice convening the meeting, and the report and accounts for the six months ending Dec. 31, the principal features of which were dealt with in the "JOURNAL" for the 19th ult., were presented.

The CHAIRMAN, in moving the adoption of the report, said it showed that the net profit made during the past half year had been £44,953; and that, after paying the dividend on the share capital and interest on the debentures, amounting to £43,924, there was left a balance of £1029 to be added to the amount brought forward, making £29,881 to the credit of the current six months. They would none of them, he thought, have any cause to be dissatisfied with the working during the past half year, which was very different from what he had anticipated. The enormous advance in the price of coals, and many other drawbacks, made him feel that there would be a considerable balance against the Company when the accounts came to be made up. That this was not the case was, they would agree, very satisfactory indeed. The reserve fund amounted to £86,848, and was as much as the Company's Act permitted them to retain. They had received more for gas by £26,230 during the past half year. No doubt this was very much in consequence of the increase in the price of 4d. per 1000 cubic feet; but it was also due to a large increase in the consumption. Coke had realized £13,685 more; tar, £1433 more; and they had expended less upon the repair of mains by £1374. This was the bright part of the balance-sheet. The expenditure was as follows: First, coals had cost more by £38,940. They had had greater difficulty in keeping up the quality of coal supplied to them by their contractors than at any period during his chairmanship of the Company. In his opinion, it was not creditable to the contractors that, after charging this advance of £38,940, they should send the Company inferior coal. On the previous Monday he had to write to one contractor who had been complained of since June, 1900, eight different times. His coal was of inferior quality, and on many occasions had been refused and sent back. He told that contractor distinctly that any further repetition of cause of complaint would involve the breaking of the contract by the Company, and that he might take any course he thought proper to punish them for so doing. He did think that traders who had had this excessive advance were under a special obligation to see that they delivered the quality of coal they contracted to supply. For purifying, they had spent £861 more; on repairs of works, £1524 more; dividends came to £1032 more; and they had received less for sulphate of ammonia by £798. This was in consequence of a reduction in price, as well as the loss the Company had suffered by the fire in December, 1899, which prevented them from making the acid required, which they had to purchase. The consumption of coal had been 5414 tons more than in the corresponding half of 1899, and the cost had averaged 14s. 4d. per ton, against 9s. 1d. in the previous year and 7s. 8d. in 1898. They would see, therefore, that they had paid during the past six months nearly double the price they were paying two years ago. The gas sold had increased by 43 million cubic feet, or equal to 3·19 per cent.; and he was glad to say that the increase for the first two months of the present half year had been still larger than that—61,320,000 cubic feet, or 8·78 per cent. The leakage also had been very satisfactory—55 million cubic feet, or 3·85 per cent. He knew few companies who worked with less leakage. During the six months, 1276 tests of the quality of the gas had been made, averaging 17·43 candles; in the twelve months, 2461 tests, averaging 17·41 candles. The prospects of the Company at the present time looked very bright. The number of additional meters supplied to consumers during the past twelve months was 3319, ranging from 2 to 500 lights; and the total number of meters out was 64,778. During the twelve months, 100 additional gas-engines had been fixed, and they had sold 1395 gas-fires and 973 boiling and other stoves; while 485 additional cookers had been let on hire. The number of Welsbach burners in use was rapidly increasing. The sale during the twelve months had been 10,696; showing that these burners were coming into universal use. Professor Slaby, a well-known electrician and expert, had recently said that gas was not going to be cut out by the electric light yet. In fact, he said that the electric light would never completely supersede incandescent gas lighting. One of his (the speaker's) friends in Sheffield told him his gas bill for the last three months amounted to £3 3s. 4d.; and that his neighbour, occupying the same sized house, said his gas bill was £2 2s. 11d., but also added that he had to pay a bill for electric lighting for the same period of £7 13s. 4d., making together £9 16s. 3d. Professor Slaby, knowing the difference in the cost of gas and electric light, might well make the remark he did. The Welsbach burners, he need hardly remind the proprietors, consumed only 4 cubic feet of gas per hour; and the cost of light so produced was only 1d. for ten hours. With such a mode of illumination available, he could not understand people continuing to use the old flat-flame burners. By adopting the Welsbach burner they could get a light equal to 73 candles for ten hours for 1d. Some people fancied that the trouble of the mantles and burners made them objectionable; but the Company maintained Welsbach burners and mantles, and their workmen visited the houses of consumers every fortnight, attending to them, and the charge for so doing was only 4d. per burner per month. The mantles and burners were not quite so low in price as they were in Germany; but the time would come when they would be quite as cheap here as there. A subject to which he felt compelled to allude was that of the electrolysis of gas and water pipes and mains by electricity from tramways. This matter had engaged the serious attention of electricians. Sheffield was rapidly extending its tramways on the overhead electric system; and the danger arising from the rails and underground cables in connection with the tramways could not be shelved or put aside. It must follow, unless every precaution was taken—and as to such precautions being taken, the Company were not yet informed—any leakage of electricity would leave a tram rail or cable, attack the iron gas and water pipes, and destroy them in a very short time. The tramway authorities would, he felt sure, be made by Parliament responsible for all the damage they did to gas and water mains. At present they were not responsible; and unless they were made so, they would fail to see the absolute necessity of taking every possible precaution to avoid electrolysis. The Sheffield Corporation had a Bill in Parliament for extending their tramway system; and the Company felt it was their duty to the shareholders and the pubic to seek to get that responsibility placed upon the tramway authorities. Mr. Charles Wood, the President of the Manchester District Institution of Gas Engineers, at the recent annual meeting, referred to the injurious effects of electricity on gas mains and services, and said that in New York alone miles of gas and water pipes had been taken up, having been more or less destroyed by electricity escaping from tramway circuits. Thus it would be seen that the danger was a matter for the consideration of all gas companies. The insidious nature of this electrolytic action was most remarkable. Scientific men said that the existence of any injury would in all probability not be apparent until the whole length of a main had been more or less destroyed. Mr. Wood stated that in Bradford only one pipe had been found entirely melted by electricity; but they had not taken up all their pipes. How they found that one case out was, he supposed, through some escape of gas. The Company desired to have a clause inserted in the Bill which the Corporation were promoting. They did not want anything but what was right and just; but they felt it was their duty to do their best to have this clause inserted. They had approached the Corporation; but, so far, that body had not yielded to their pressure and to their desire. They could not, however, afford to have their mains and pipes destroyed by this electrolytic action. The danger to the gas-mains from electrolysis, if it was as great as some scientific men believed it to be, was such that the Board of Trade or Parliament would of necessity be compelled to protect the gas undertakings and the public. The danger to life and property by gas explosion, if this practice were continued, would be a very serious matter. To show that there was no desire on the part of the Company to do anything but what was fair and just with the Corporation, he would read the clause which the Directors wished to insert in the Bill of the Corporation. It was as follows:—

> And, notwithstanding anything contained in the said Acts [*i.e.*, the Acts already passed] or this Act, the Corporation shall make full compensation to the Sheffield United Gaslight Company for any damage to the mains, pipes, or other apparatus of that Company, caused by any currents generated or used for the purpose of electric traction on any of the tramways for the time being belonging to the Corporation, and for any loss resulting therefrom.

He failed to see that reasonable men could object to a clause of this kind; and he thought the Corporation would say, before they had a severe fight, and spent a lot of their own money and compelled the Company to spend money, that they would do what was right and just. Turning to electricity, he would like to call attention to the expenditure of municipalities in various parts of the country on electric arc lighting. The St. George's, Hanover Square, Vestry, in October last agreed with the Westminster Electric Supply Association to make a contract for 31 years to pay £32 per lamp per annum for arc lighting which the Association were to provide. If they could not get illumination as good for half that money, he (Sir Frederick) knew very little about gas lighting. The London Vestry was not the only public body to make extravagant bargains of that kind. He heard a rumour the other day that the eight arc lights round the Sheffield Town Hall had been charged for at the rate of £400 for twelve months' use, *plus* £50 for cleaning. He had since heard that only three of these lamps gave light all night; five of them being extinguished at midnight. He heard further that the claim of the Electric Light Department had been reduced to £200 for the eight lamps—that was to say, to £25 per annum for each lamp. Well, now, what kind of illumination could they have for a quarter of that sum? They could have incandescent gas-lamps with four burners each, three of which could be extinguished at midnight, leaving one burning all night, for £5 5s. a year each lamp. These lamps were in use up and down the city; and he was of opinion that they were good eneugh for any place or street in Sheffield. The £5 5s. a year included all expenses; so that they could have 40 such lamps for the same money as these eight electric arc lamps were costing, only three of which were kept alight all night. In conclusion, Sir Frederick alluded to a letter recently published in a Sheffield newspaper, complaining that the men employed by the Company in making the gas were underpaid, and were not paid for holidays when they had them. The subject had had the attention of the Directors. Since August, 1899, they had had one claim after another made upon them, and these had always been attended to and considered. From Aug. 24, 1899, to Nov. 30, 1900, they had made advances amounting to £4055 per annum. Last month they found nine men only who had not been advanced; and these they at once raised from 4s. 6d. to 4s. 9d. per day. These men were simply employed at an exhauster, which they had to watch, along with a diagram, to see that the work went on right. They had practically no manual labour to perform, yet the Directors agreed to pay them 4s. 9d. per day. When the Company increased the wages of labourers and others in their employ, they had to consider what the same class of workmen were receiving in Sheffield. They had no labourers who received less than 23s. per week of 54 hours. The gas workers, such as stokers, only worked eight hours per shift, for which they received 5s. 9d. per shift; and there was no place in England that paid more than 5s. 9d. for that work, except two in London—the South Metropolitan Gas Company, who paid 5s. 10d., and the Gaslight and Coke Company, who paid 6s. Therefore he considered that the wages of the stokers employed by the Sheffield Company should be satisfactory to them. It might be said that more coal was carbonized by the men in Sheffield than was done by the stokers of some other companies. Ever since he had been Chairman of the Company, the quantity carbonized had been four tons per shift of eight hours per man. Surely four tons of coal should not be too much for a man to put into the scoop, and with the aid of two other men, lift up to the retort, in eight hours. It was a very different thing from having to use the shovel. He could not think that any reasonable man could want to reduce the four tons to a smaller quantity. It was true that some municipalities in England fixed the quantity carbonized per man at less than four tons; but, so far as he was concerned, he thought it was a reasonable weight, and he hoped the Company would always be able to maintain that amount of work from their men.

Mr. E. HALL seconded the motion.

Mr. J. WILSON asked if there was any probability of coal being cheaper, for the price at present was enormous. He said he could remember when the Company paid about 5s. a ton, instead of nearly 15s.; and at that period gas was 8s. 4d. per 1000 cubic feet, instead of 2s. 2d., as it was now. It was wonderful that it could be made at the price. Was it the consumption, or was it good management?

The CHAIRMAN said that, unfortunately, the Company's contracts, which were made at a high figure under great pressure, did not terminate until June next. But they were not paying the contract price for all the coal they were buying; and he could tell them that another Company with which he was connected were now buying coal at 8s. 6d. per ton. He had no doubt the price in the market would be less before long. What he complained of was that the people who supplied the Company did not keep to their contracts, but charged this high price for an inferior quality of coal in a way that was neither fair nor honest. He did not think the officials of the Company ought to be called upon to watch the coal as they had to do now, lest the Company should be imposed upon; and he did not intend it to go on any longer.

The motion was carried.

A dividend at the usual rate was sanctioned; and the proceedings concluded with a hearty vote of thanks to the Chairman for presiding, and for his past services to the Company.

GERMAN CONTINENTAL GAS COMPANY.

Report and Accounts for 1900.

We have received, as usual, a copy of the annual report and balance-sheet to be submitted, on the 29th inst., to the forty-sixth annual general meeting of this Company, of which Herr W. von Oechelhaeuser is the General Manager.

The report is truly a record of progress and prosperity such as the majority of British gas undertakings will envy. An increase in production of 8·44 per cent. over that of the preceding year, and a dividend of 14 per cent., as compared with 13⅓ per cent. in 1899 and 12½ per cent. in 1898, are remarkable achievements in a year which has been generally noteworthy for no appreciable advance in the sales of gas, and for greatly diminished profits. It is, therefore, not surprising to find the report couched in cheerful and congratulatory terms.

The consumption of gas for illuminating purposes has increased by 7·27 per cent., and now constitutes 74·08 per cent. of the total production. The increase in the amount of gas used for heating and power purposes is 11·09 per cent., and the quantity consumed under these heads is now 20·64 per cent. of the make. The work's consumption and the unaccounted-for gas together amount to 5·28 per cent. The number of burners in use has increased from 595,859 in 1899 to 658,484; but the consumption per burner shows a slight falling off, and now averages 3080 cubic feet per annum. There are 1051 gas-engines in use, representing a total of 5920¾-horse power, and consuming 9·80 per cent. of the total make of gas. During the year, the Company have acquired the gas-works of the small town of Wickrath, in the Rhine Provinces, and are managing them from their station at München-Gladbach. They have also secured a concession, expiring in 1929, to light from the Herbesthal works the small Belgian border town of Welkenraedt. These new districts are, of course, responsible for a small proportion of the increase in the number of burners in use. But the report states that the total increase is greater than the total number of burners in use in Erfurt, which is a town of about 94,000 inhabitants, and has the fourth largest of the Company's works. A new concession, terminating in 1920, has been secured on favourable terms for the continuation of the supply of the town of Frankfurt-on-the-Oder, which has been lighted by the Company since 1855.

The Directors express the opinion that the consumption of gas for lighting purposes must increase without special pushing; but they regard the prepayment meter as a most useful aid in augmenting the use of gas for cooking and heating. At the close of the year, 10,474 prepayment meters were in operation, all having been made by the Company at their Dessau workshops.

The water-gas plant on the Dellwik system which has been installed at the Erfurt works, has quite fulfilled expectations; and the Directors consider that, having regard to the considerable rise in the price of coal and the continual advance in wages, they will have to depend on this method of gas production for future requirements at other of their works. Favourable coal contracts, made before the great advance in prices, covered the year's supply, except in the case of Warsaw, where some supplementary purchases had to be made. The quality of the coal, however, was bad, and only 10,750 cubic feet of gas per ton were obtained on the average, against 10,870 cubic feet in the preceding year. The coke used for firing the retort-furnaces amounted to 16·71 per cent. of the weight of coal carbonized. The competition of other means of lighting is viewed without fear by the Directors, who advise shareholders who may be perturbed by glowing accounts of new inventions in electric lighting, to regard only performances on the working scale, and to disregard mere laboratory trials.

The Company's electricity supply station at Dessau has done well with an increase in output of 22·5 per cent.; and it has been found necessary to add two new 200-horse power gas-dynamos to the plant there. The gas-engines at the station showed about the same duty as the preceding year—17·6 cubic feet per effective horse-power-hour.

It has been necessary, in consequence of the extension of the Company's business, to make a further small issue of capital. The gross profit for the year 1900 amounted to 4,250,333·21 marks (about £207,330), and the net profit to 3,272,787·50 marks (about £159,650). The net profit shows an increase of more than £3000 over that for the preceding year. The customary payments have been made to the Directors, and to the reserve, renewal, and contingency funds; and after making provision for a dividend at the rate of 14 per cent. for the twelve months, a balance of 45,625·03 marks (about £2225) is carried forward to this year's account.

PROVINCIAL GAS COMPANIES.

In moving the adoption of the report, noticed last week, at the recent half-yearly meeting of the Hastings and St. Leonards Gas Company, the Chairman (Dr. Gray, J.P.) expressed his pleasure in doing so, as the heavy cloud which had hung over the Company was gradually lifting. There had been an increase of £7974 in the expenditure, as compared with the latter half of 1899; but, on the other hand, there had been an augmentation in the revenue, though to the extent of only £6140. Of this, however, £2548 was an increase on the sale of residuals which was not expected. It was a sort of silver lining to the cloud. Altogether, there was a deficit on the half year of £1834, or, taking from this the proportionate amount of dividend under the sliding-scale, it was about £1000. On the year's working there was a profit of £9846, which was sufficient to pay the interest on the debenture stock and the whole of the statutory dividend under the sliding-scale. With regard to the consumption of gas, there was an increase of 19½ million cubic feet on the entire year; there had been 440 additional stoves placed; and the number of consumers was greater by 500. As the result of negotiations by the Engineer and Manager (Mr. C. E. Botley, M.Inst.C.E.), fresh contracts had been made for coal upon terms which enabled the Directors to reduce the price of gas 4d. per 1000 cubic feet as from the 1st prox.; bringing it down to 3s. 4d. This announcement, he said, was the result of having good contractors, and being good customers. He gave a sketch of the history of the Company, which commenced business on Jan. 1, 1832, with a nominal capital of £16,000, and a loan capital of £1000. The value of the works and the land was only £12,000. In order to obtain reliable material, they ought not, he said, to deal with the facts and figures of the Company until 1850, when the undertaking had had eighteen years in which to become well established. In 1850 the issued capital amounted to £17,000, and at the end of 1900 it was £276,000. The number of shareholders at the close of 1850 was 50; in 1900 it was 542. In 1850, 1500 tons of coals were used; in 1900, 43,300 tons. The gas sold in 1850 was 13 million cubic feet; in 1900, 419 millions. The price of gas at the time the Company started was 12s. per 1000 cubic feet; in 1850 it was 8s.; and to-day they proposed to make it 3s. The number of gas consumers in 1850 was 445; and at the close of the century 9054. The wages at the works at the former date were £590; and at the close of last year £16,122. The local rates and taxes showed the largest increase of all. In 1850 the amount was £46; but the end of 1900 showed it to be £2647. The coal duty in 1850 was £188; now it was £4022. These figures showed that great progress had been made during the half century just closed. As to the future, one of the principal changes to be carried out would be the recognition of the heating power of gas rather than its luminosity as the true test of its value. They found that the incandescent light was becoming more and more popular. On the Continent, the people had moved more rapidly in this matter than they had done in England, as gas companies were not hampered by Parliament and by municipal government in respect of candle power. In Germany, gas of 10 and even 8 candle power was supplied under municipal authority; and a better light was produced with it by means of incandescent burners. He concluded a long and interesting address by saying the Company could look back over the past half century with a great deal of satisfaction. The report was adopted.

At the recent half-yearly meeting of the Lewes Gas Company, the Chairman (Alderman C. R. Kemp), in moving the adoption of the report, remarked that those who were present on the previous occasion would remember that something was said with regard to the price of gas. He then stated that he was sure the Directors would only be too happy to reduce the charge, in their own interest as well as in that of the consumers, as soon as they could see their way to do so. The Board had now redeemed that pledge, and the price would revert at the end of the present quarter to 3s. 10d. per 1000 cubic feet (being 8d. off), at which it had stood for many years. He thought this must be a course which would commend itself to the consumers; and he trusted it would be conducive to the well-being of the Company and the interests of the shareholders. With regard to the electric light, he felt that it was meeting with increased competition in the improved gas and gas-burners which were being brought into use; the incandescent mantle being undoubtedly a very formidable competitor. At the same time, they, of course, admitted that the electric light offered competition with gas. The Company, however, would promote business in every direction. They wanted not only to sell a good article for lighting, but to stimulate the sale and use of gas for cooking and heating purposes; and certainly, in the interests of the consumers, and he trusted also in those of the Company, it would be their duty to supply the best gas they could at the lowest possible price. Mr. Oke, in seconding the motion, said he thought the Directors had acted very fairly in taking the earliest opportunity of reducing the price. It was apparently owing to the Chairman, as an expert on the coal question, that they were able to be among the first to announce a reduction. He felt the consumers ought to appreciate the efforts made by the Company, not only to supply a good article, but to do so at a reasonable rate. The motion was carried. The Chairman then proposed a resolution authorizing the Directors to pay dividends for the half year at the rate of 5 per cent. upon the consolidated original capital stock, and of 3½ per cent. upon the additional stock; and it was carried. Thanks were accorded to the Chairman and Directors, the Secretary (Mr. H. J. Hillman), and the Manager (Mr. Levi Monk); and the proceedings closed.

At the annual general meeting of the Sheppy Gas Company last Wednesday, the Directors reported that the profit for the past year was £548 short of the amount required to pay the full statutory dividends, yet they recommended that this should be done, and the deficiency made up from the accumulated profit. There was an increase of nearly 5 per cent. in the consumption of gas, notwithstanding the advance in price. This the Directors attributed to the increasing use of gas for cooking purposes, and the spread of the prepayment system among small consumers. Reference was made to the death, in November last, of Mr. A. W. Marks, scarcely two years from the time of his well-earned retirement from the position of Secretary, which he had occupied for 38

years. The accounts accompanying the report showed that the revenue for the year was £15,278; and the expenditure, £12,452—leaving a balance of £2826. Mr. C. B. Shrubsole, Chairman of the Board, presided, and, in moving the adoption of the report and accounts, said he thought the shareholders would agree with him that, considering the adverse circumstances under which the Directors had laboured, the year's working was not unsatisfactory. The high price of coal had been accompanied by a rise in the price of nearly all the material used in effecting repairs, with the result that the expenditure had gone up by £2550, to meet which the increase in the price of gas and the returns from residuals had brought in £2000, leaving the Company £550 to the bad—an amount which agreed with the estimate of the Directors when they advanced the charge for gas. There had lately been a considerable fall in the price of coals, which were selling in Newcastle at from 4s. to 5s. less per ton; and the Directors therefore anticipated being able to enter into a more favourable contract, and to give the consumer the benefit. He noted with satisfaction that the consumption of gas had increased 5 per cent. during the year, and mentioned that 100 additional prepayment meters had been fitted. The works had received every consideration. He alluded to the great loss the Company had sustained by the death of their old and esteemed friend Mr. Marks, to whose untiring efforts the success of the undertaking in the past had been largely due. The Directors did not recommend that the vacancy thus caused on the directorate should be filled. In conclusion, he said that, after taking £548 from the accumulated profit to pay the dividends, they would still have £700 to the good. The report was adopted, and full dividends on the various classes of shares were declared. The proceedings closed with the customary votes of thanks to the Directors and officers; the Secretary (Mr. H. Barber) and the Manager (Mr. W. T. Carpenter) replying for the latter.

The annual general meeting of the Southend Gas Company was held on Monday last week—Mr. Charles Woosnam in the chair. In moving the adoption of the report, he stated that the result of the year's working was a sum of £4813 available for distribution; and after paying a dividend of 5½ per cent. for the half year, there would be left a balance of £2245. The quantity of gas produced was 139,861,000 cubic feet, or 20 millions more than in 1899. A great deal of the increase might be attributed to the new retort-house. In 1894 the make was 40 million cubic feet; in 1900, six years later, it was 140 millions. They had gas-mains covering 37 miles. Some months ago they commenced to put down 24-inch mains; and they were also going on with 6 and 12 inch pipes. The number of consumers was rather over 5000. Mr. Richmond seconded the motion, and it was carried; and a dividend at the above-named rate was declared. A vote of thanks having been accorded to the Directors and officers, the Chairman returned thanks, and referred to the ready assistance the Board always received from the Secretary (Mr. J. T. Randall) and the Engineer (Mr. Frank Clark).

INTENSIFIED GAS LIGHTING IN MANCHESTER.

A Successful Experiment.

Our readers are aware that, as the outcome of a visit to the Metropolis, the Gas Committee of the Manchester Corporation recently decided to put up an installation of incandescent gas lighting on the esplanade of the Royal Infirmary, Piccadilly, with the view of testing the value of the system for public lighting. The experiment has been carried out under the supervision of the Gas Engineer to the Corporation (Mr. J. Gibson Newbigging); the lamps having been designed and supplied by the Welsbach Incandescent Gaslight Company. There are in all nine lamps, seven of which are fitted with four-light, and two with three-light clusters of Kern burners. There is also one burner fixed in the underground lavatory. The total consumption of gas by the 35 burners is 350 cubic feet per hour, and the illuminating power claimed per cubic foot consumed is from 30 to 35 candles. Taking the lower figure, this gives an illuminating power of 10,500 candles for the installation. The gas is supplied to the burners at a pressure of 8 inches of water, by the aid of a Keith compressor, actuated by the city water supply. Meters have been fixed to register the consumption of gas and water, so that the exact cost of the lighting will be ascertained. Making liberal allowances for maintaining the installation in efficient working condition, the cost of the lighting will be less than half that of the electric arc lighting. The installation was inspected last Friday night by members of the Gas Committee, including the Chairman (Alderman Gibson) and Deputy-Chairman, the Lord Mayor (Mr. T. Briggs), the Superintendent of the Gas Department (Mr. Charles Nickson); and Mr. Newbigging. It was considered to be highly satisfactory; the intensified gaslight excelling the light of the electric arc lamps to such an extent that the extinction of the latter did not seem to make any perceptible difference to the illumination of the roadway. The fitting-up of the installation has been done by the staff of the distributing department of the Gas Committee, under Mr. Waddington; Mr. Gresty representing the Welsbach Company. The Committee claim that the installation is the finest of its kind in the kingdom. At a gathering of the company subsequently at the Town Hall, Alderman Gibson explained that, in the action the Committee had taken, they were influenced by one idea only—viz., to produce the very best light at the lowest cost. They intended to make the trial thorough. It was not a question of competition with the Electricity Committee; but he thought that what the members had seen that evening augured well for the still better lighting of all the squares and streets in the city by the new process.

Pipe Competition.—At the meeting of the Keighley Town Council last Tuesday, on a minute of the Gas and Electricity Committee to purchase 560 yards of iron pipes from the Staveley Iron Company, Alderman Brigg mentioned, as an interesting point in connection with local trade, that whereas formerly tenders for the supply of pipes were almost exclusively confined to Keighley, in the present instance, for even so small a contract, they had tenders from London, Chesterfield, Nottingham, West Bromwich, Middlesbrough, Hull, France, and America. Oddly enough, the American price was considerably above the others; while the French price was very close indeed to the English prices.

WEST BROMWICH CORPORATION GAS SUPPLY.

The Allocation of Gas Profits.

In connection with the recent discussion on the above subject in the West Bromwich Town Council, as reported last week (p. 697), it will be of interest, as explaining the position taken up by Mr. C. D. T. Bushell, the Chairman of the Gas Committee, to reproduce, as we have permission to do, the following letter which he addressed to the members of the Committee early last month, and to which he referred in the course of his speech:—

Gentlemen,—Since you did me the honour to elect me your Chairman, I have devoted much thought to the undertaking, which completed its twentieth financial year last March; and seeing that the time is approaching when the Council will require to know whether we are prepared to again grant money in aid of rates, I consider it my duty to put before you a short review of the past, and to show how, in some important particulars, the present is thereby affected and the future prejudiced.

Before dealing with these points, we may fairly congratulate ourselves upon the satisfactory and almost continuous growth in the consumption of gas—the demand being now more than double that of twenty years since; and it is still increasing, so that within a year or two, more plant will be necessary, involving an expenditure quite disproportionate to the immediate profit resulting therefrom.

However, the gratifying fact remains that our predecessors in office, who advocated the purchase and carried it through, conferred a lasting benefit upon the town; and although we might easily have been in a stronger financial position than we are, it only needs a few years' economy of profits to pull up the leeway, and put the concern upon such a basis that it will bear comparison with almost any other. I am happy to know that in some respects it is so even now, for, from the published accounts of Birmingham, I find our average cost per 1000 cubic feet during the last five years (*minus* maintenance) was 0·68d. less, which is sufficient to cover the possible difference in candle power; or, if maintenance is included, our cost was 2·42d. less. It thus appears (assuming equal candle power) that we charged 1·74d. per 1000 cubic feet less to revenue than was done at Birmingham, which, reckoned upon the 1,263,132,000 cubic feet sold by us, amounts to no less than £9157 14s. 1d., or £1157 14s. 1d. more than was contributed in aid of rates during that period.

I give these figures to meet, in anticipation, the objections of those who contend that comparisons of cost should properly be made with towns more nearly on an equality with ourselves in size. My contention is that, for practical purposes, our output is sufficiently large for comparison with very much larger works; and, further, there is, to my mind, the conclusive reason that, if we are to fulfil the pledges given by our predecessors in office, it is our plain duty to supply our consumers with a quality of gas not inferior to that they would have received, and at the same prices they would have paid, if Birmingham had continued to supply. The same remark applies to public lighting, for which Birmingham charges about half our price for the gas.

There are some rather abstruse points affecting the capital account and also the alleged benefits derived from the allocation of profits in aid of the rates. At my request, Mr. Hudson has made a careful examination of the facts, and has reported the result in a very able and lucid manner, for which I thank him. I append hereto a copy of his letter, which I venture to believe will interest you very much. The concluding paragraph I especially commend to your notice, for if consumers alone pay for the works, surely it is their right to have the debt brought within absolutely safe limits, in the shortest time, with their own money.

You are aware that £25,500 is the total sum given in aid of the rates during the past twenty years. If this period be divided into five terms, each of four years, we find the following amounts: £12,000, £1500, £4000, £1000, and £7000; so that the first four years contributed over 47 per cent. of the total, ending with an empty exchequer and a heavily overdrawn bank account. It occurred to me to work out these sums at per ton of coal carbonized during each period of four years, and the result is as follows:—

Average Profit Contributed per Ton of Coal Carbonized.

In the four years ending	March, 1884	3s.	11d.
,, ,,	March, 1888	0	5
,, ,,	March, 1892	1	0
,, ,,	March, 1896	0	2¾
,, ,,	March, 1900	1	4½

Roundly, this is 1¾d. per 1000 cubic feet on an average of the whole period; and even this is manifestly more than the business has been able to bear. A still more startling result is obtained if we calculate the first four years' average of 3s. 11d. per ton upon the entire quantity of coal carbonized. We then arrive at a total of £78,080, against the £25,500 actually given—an annual average of £3904, against £1275 actually paid.

The next point to which I call your attention is the great benefit the borough derives from the gas-works in the shape of rates. The amount for the last financial year was £1678 6s. 8d., or 1-34th part of the whole of the rates paid; while the total rates paid during the twenty years was £24,157 10s. 5d. A great part of this large sum could not have accrued to us if Birmingham had continued to supply.

The last important point that occurs to me is that coal gas no longer holds undisputed possession of the field, for we are now threatened with the Mond gas for power, and electricity challenges it both for light and power. In connection with electricity and gas, I can safely assure you that, in the essential matter of cost, whether for light or power, the advantage lies enormously in favour of gas; but where cost is of secondary importance, electricity is rightly described as the "light of luxury," although, for street lighting, even a lavish expenditure for electricity will not yield nearly so good a result in brilliancy, penetrating power, or steadiness, nor can it be so conveniently spaced in the streets—a most important consideration where they intersect. However, there is room for both. Each has its peculiar advantages and drawbacks; and both being corporate property, we must see to it that each has a fair field and no favour, and I hope both may prosper.

The position of affairs is shortly this: The service of our debt costs us 2½d. per 1000 cubic feet more than Birmingham, or (say) over 2s. 1d. per ton upon the coal carbonized—amounting for the year ending the 31st of March last to no less than £3080 os. 7d.; and if the situation is to be saved, I think you will agree as to the imperative need for an alteration in our policy, otherwise we shall hand over to our successors an intolerable burden.

The following is the letter of Mr. Hudson referred to by Mr. Bushell:—

Town Hall, West Bromwich, Jan. 28, 1901.

Mr. Councillor Bushell, J.P., Chairman of the Gas Committee.

Dear Sir,—It gives me pleasure to comply with your request to furnish you with the amount of the capital outlay on the gas undertaking, and the consequent annual charges thereon; also a statement of the financial effect of allocating a proportion of the profits in relief of parochial rates.

I have drawn the attention of the Gas Committee, on several occasions, to the excessive amount of the capital account, and to the fact that it much exceeds that of many other undertakings of a similar size. This account, therefore, imposes a heavy annual burden in the shape of interest and sinking fund. In the financial year ending March, 1900, the interest and sinking fund paid amounted to £8645, equivalent to 7d. per 1000 cubic feet of gas sold, of which no less than 4d. was in respect of interest. Since the commencement of the undertaking in the year 1880, a sum of £111,713 has been paid in interest alone, and £39,704 set aside for the redemption of the debt. The latter item is greatly disproportionate to the former, more particularly when it is remembered that during that period £25,500 of gas profits were allocated to the relief of the rates. The burden of the capital account is also accentuated by the unfortunate fact that a far too large proportion is of a distinctly unremunerative character, through the inclusion of charges which, in a joint-stock company, would have been met from other sources.

With regard to the question of relieving the parochial rates by contributions from the gas profits, and the effect which the contributions already made have had, and will have, upon the finances of the undertaking, I would point out that, if the amount contributed down to the present time had been applied instead in liquidation of the gas-works debt, the Gas Committee would have saved the undertaking £9600 in interest to date, and a further saving in the future, during the continuance of the loans, of £22,950, or a total of £32,550. If, therefore, this amount be added to the contributions of £25,500, we obtain no less a sum than £58,050, representing about 35 per cent. of the net debt to-day. That is to say, the relief of the parochial rates in the past to the extent of £25,500 out of the gas profits will cost the undertaking in interest the sum of £32,550, apart from the amount directly contributed to the rates.

It is generally supposed that the amount contributed by gas consumers in aid of rates is returned to them through the rates. That is not so. The gas consumer could only obtain an equivalent reduction in his rates if all ratepayers were gas consumers, and provided further that the ratepayer's gas consumption and rate assessment bore the same relative proportions to each other, which they do not, except in isolated or accidental cases. In this connection, and with the view of showing the inequalities arising out of the present policy, I have made certain comparisons as between the gas consumer and the ratepayer, dividing them into classes to produce the nearest approach to equality. I took, firstly, ten large users of gas, without any regard to selection, and found, according to their assessable value to the general district rate, that a reduction in the rate of 2d. in the pound would relieve them to the extent of £33 os. 7d.; but if the equivalent of a 2d. rate were applied, on the other hand, in lowering the price of gas, then these ten gas consumers would benefit to the extent of £102 9s. 6d. In other words, the ten consumers in question produced £102 9s. 6d. profits in aid of the rates, but they received back in reduced rating only £33 os. 7d., or about 32 per cent. of the profit they contributed through consuming gas. The holders of licensed houses were taken in the same way; and it was found that as ratepayers they received back about 49 per cent. of the amount they had earned as gas consumers. In the case of the larger shopkeepers, it was found that as ratepayers they received back about 58 per cent.; while the occupiers of the same number of the larger villa residences received 82 per cent. In the case of many of the houses rated at about £14, no great injustice or inequality exists; a reduction in the price of gas being approximately equivalent to a reduction in rating. In those houses, on the other hand, which are rated below £14, inequalities occur varying from 10 per cent. and upwards. With regard to the Railway Companies, a reduction of 2d. in the pound in the general district rate benefits them to the extent of £43 7s. 9d.; whereas the equivalent of the profit derived from them through the consumption of gas amounts to £18 14s. 11d. only. Lastly, in the case of certain large ratepayers, who are non-consumers of gas, a reduction of 2d. in the pound in the general district rate means a subsidy of £102 5s. 5d. The non-consuming ratepayer and the Railway and Canal Companies are thus being largely benefited at the expense of the general body of gas consumers.

It may be said, as regards an average of the whole borough, that for every shilling of profits given by gas consumers in aid of rates, only about 7¼d. is returned to them in reduced rates—the remaining 4¾d. being absorbed by the non-consuming ratepayers. That is to say, 39 per cent. of the gas profits given in aid of rates goes to benefit other than gas consumers; and the gas consumers are therefore doubly taxed to that extent. Furthermore, it is very doubtful whether householders whose rates are compounded always obtain the benefit of these grants-in-aid; and when it is remembered that one-third, or thereabout, of the total assessments of the borough consist of compounded property, the extent to which a divergence of supposed benefits is possible, is at once apparent.

The supporters of the policy of contributing gas profits in aid of rates further allege that the fact of the ratepayers *per se* having made themselves liable for the gas-works debt entitles them to the profits of the concern. The ratepayers of West Bromwich have not, however, been called upon, as yet, to provide a single penny for the gas-works; nor is such a contingency in the least probable. On the other hand, it may be reasonably contended that the possession of the gas-works—the only remunerative undertaking of the Corporation—has assisted in the borrowing of money at a lower rate of interest than that at which it would otherwise have been obtainable. I would also venture to point out, what is frequently overlooked, that gas consumers alone are liquidating the debt on the gas-works, independently of the rates—that is to say, they are paying for a valuable property entirely out of the profits.

THOS. HUDSON, Secretary to the Gas Committee.

LEICESTER CORPORATION GAS, ELECTRIC LIGHTING, AND WATER UNDERTAKINGS.

At a Special Meeting of the Leicester Town Council last Wednesday, the half-yearly reports of the Gas and Electric Lighting Committee and the Water Committee were presented.

In regard to the gas undertaking, it was stated that the accounts for the half year to Dec. 31 showed a net profit, after paying interest on capital, of £10,841. Of this sum, £5194 had been paid into the sinking fund; leaving a balance of £5647, which, added to the balance from the preceding half year, made a total of £25,535 to be applied to the district fund at the close of the current financial year. On the electric lighting undertaking, a profit of £1287 was left after paying interest on capital, and £1068 to the sinking fund. The profit from the preceding half year was £362.

The MAYOR (Alderman Lennard), in moving the adoption of the portion of the report referring to the Gas Department, remarked that this was the twenty-fifth time he had done so. He did not know there was anything that called for special remark, excepting that they were still increasing. Taking the items of expenditure, coal had, of course, advanced; and he estimated that in the current half year, they would not make any profits at all, as the Committee were still using coal bought at 5s. per ton extra last June. Besides this, the value of coke had gone down; and their contractors were loth to take any from them at higher figures than the present market price. Considering these facts, he could not look forward this half year to making a profit at all; but in the second half of the year, they would probably be buying coal at 3s. 6d. per ton less than they were giving now, and probably cheaper than that.

Mr. EDWARDS seconded the motion, which, after a short discussion, was unanimously carried.

The MAYOR next moved the adoption of the electric lighting report; quoting a number of figures to show the prosperity of the undertaking. They had, he said, a net profit for the year of £1649, or £2400 to the good, after paying off charges on the sinking fund, which now stood at £9001. These figures, he argued, spoke for themselves. The works were of the most permanent and satisfactory character. He knew many works throughout the country which were going to pieces. Many of their neighbours had had to raise their prices; but the Leicester Corporation had not found it necessary to do so. The undertaking was growing steadily and prosperously.

The motion was also carried.

The net profit made by the Water Department, after paying interest on capital, was reported to be £9568. Out of this sum, £3204 had been paid to the sinking fund; and the Committee recommended that the balance of £6364 should be credited to the special water fund created under the Derwent Valley Water Act. The quantity of water delivered within the limits of supply during the year 1900 was 1,829,152,889 gallons; and the average consumption per day per head of the population supplied was 19·88 gallons—these figures including the quantity supplied for trade purposes. The number of houses on the books at the end of December was 51,794; giving an estimated population of 258,979, an increase of 4·34 per cent. per annum.

Alderman E. WOOD, moving the adoption of the report, said it was most gratifying to know that the income of the department was steadily increasing, while the expenses had not advanced to any great amount. The increase of business had not proved any extra burden on the department; and he was glad to be in the position to say their reservoirs were full.

The report was adopted after a brief discussion.

GAS CONSUMERS' INTERESTS DEFENDED AT HALIFAX.

No Increase in Price and No Profits for the Rates.

At a Special Meeting of the Halifax Town Council on Friday, Mr. J. Walker Clarke moved that the price of gas be increased from 2s. 2d. to 2s. 4d. per 1000 cubic feet, with the usual scale of discount. He said the estimated profit on the gas-works for the coming year was only £376, and bore no appreciable relationship to the capital of the undertaking, which was £537,979. The Corporation rates for last year were 5s. 10d. in the pound; and an advance for the coming year would be required. The charges for gas in Leeds and Huddersfield were higher than those at present paid in Halifax. Alderman Booth seconded the motion. Mr. J. Parker opposed the resolution, saying there was no justification for increasing the price. It was an unjust method of taxation. Alderman Woodhead, the Chairman of the Gas Committee, also strongly opposed the motion. He failed to see why the Gas Committee should be pitched upon to provide for the deficiencies of other committees. Why should not, he asked, some of the other industrial committees of the Corporation also pay a percentage of profit in relief of rates? Further opposition was offered by Mr. J. Collinson and Alderman J. T. Spencer. Alderman Simpson, however, remarked that by advancing the rates 2d. in the pound, and putting up the price of gas 2d. per 1000 cubic feet, no one would be hurt; and the gas-works, with a huge capital, would be put in a better trading position. The resolution in favour of the advance in price was, after two hours' debate, defeated—17 voting for, and 29 against it. The result was received with a demonstration of considerable gratification.

THE MOND GAS POWER SCHEME.

Attitude of Midland Local Authorities.

At a Meeting of Walsall Town Council on Monday last week, the General Purposes Committee submitted a report from the Parliamentary Committee appointed to consider the Mond Gas Bill. They stated that they had given the subject their careful attention, and had had a report from an expert upon the proposals contained in the Bill. Mond gas was explained to be a form of producer gas; and the Committee were advised that the heating power was only from one-fifth to one-sixth that of ordinary coal gas. Consequently, it became necessary to multiply by five the prices of 3d. and 4d. per 1000 cubic feet to be charged for Mond gas; so that they became equivalent to 1s. 3d. and 1s. 8d. for coal gas. In the case of Walsall, it was pointed out that there were only two consumers besides the Corporation who could demand a supply of gas even at 4d. per 1000 feet; while under the Bill the Company could charge what rate they liked for consumers of less than a million cubic feet per quarter. Further than this, alterations involving considerable expense would have to be made to existing gas-engines, to enable Mond gas to be used; while for the purpose of heating boilers, the gas would have to be supplied at about one-sixth of the proposed price to compete with slack at 6s. per ton. The Bill would give the Company power to interfere with the Corporation's mains and pipes, as well as the electric cables; and the Committee were advised that the mains for Mond gas would require to be at least five times the size of ordinary gas-mains. As regards the use of Mond gas for other than heating or motor purposes, there was nothing in the Bill to prevent a consumer enriching it, and utilizing it as an illuminant. While anxious not to prevent manufacturers from obtaining cheap gas for heating purposes, the Committee felt it was necessary to lodge a petition against the Bill, in order to protect the rights of the Corporation, with the object of compelling the Company to sell their gas in bulk for distribution by the Corporation, and to ensure measures being taken for its purification. They had accordingly authorized the Town Clerk to prepare and lodge a petition, and to take all the necessary steps for opposing the Bill.

At a recent special meeting of the Wolverhampton Town Council, the Town Clerk (Mr. Horatio Brevitt) explained the objects of the Mond Bill, and said it was desirable that the Corporation should, as the municipal authority of the borough, seek to have such clauses inserted as would protect the interests of the inhabitants. He might state that he had been in negotiation with the Solicitors to the Company, and, so far, they had met him fairly. But it would still be necessary that a petition should be prepared and presented, in order to give the Corporation *locus standi* in case the terms were not quite so satisfactory as they wished. When the Parliamentary Committee next met, he hoped to be in a position to show that concessions had been made of a very satisfactory character. Among the points they particularly needed to watch was the effect of such a Bill on their streets; because power was sought by the promoters of the Bill to break up the streets in the various districts scheduled in the Bill, for the purpose of laying, altering, and removing their mains. With regard to other places, he believed that in Dudley, Darlaston, Sedgley, and elsewhere, the Local Authorities had arranged terms with the promoters; but other towns were opposing. The position of Wolverhampton, however, differed from some of these; or, rather, their position was not the same in each case with other places. Some of the Local Authorities who were opposing the measure were the owners of the gas undertakings, but were not purveyors of electricity for motor and illuminating purposes, as was the case with the Corporation of Wolverhampton. But, as he said before, what they had chiefly to do was to protect their streets. The Bill provided for laying down in their streets mains 3 feet in diameter. What he wished to obtain in the first place was a list of the streets which the Company proposed to break up; and, in the next place, if they obtained the powers they sought with respect to them, that an undertaking should be given that they would not extend their mains into any other streets without the consent of the Corporation—any difference arising to be settled by an arbitrator to be nominated by the Board of Trade. Another point was to obtain the insertion of a provision in the Bill whereby the Corporation would have power to obtain from the Company gas in bulk with which to supply the inhabitants themselves for domestic purposes. The Company only desired to supply the gas for manufacturing purposes, and were willing, he belived, to permit the Corporation to supply it, as their agents, for domestic use. He should like to have a clause inserted making it possible for the Corporation to purchase, if thought desirable. Above all things, they must be ensured against the continued breaking up of the streets; and their electric cables, water-mains, sewage-pipes, and so forth, must be protected. Another matter the Corporation ought to consider was the contingency of the undertaking not being so prosperous as the Company anticipated. Under these circumstances, the Corporation ought to have a claim upon the mains and pipes; so that in the future, if it were worth while, they might have the use of them for some purpose. They ought also to have a clause inserted with respect to dividends and the price to be charged for the gas; so that the Company should not be at liberty to increase their rates at any future time without the consent of the Board of Trade. In conclusion, he said he wished it to be understood that the Corporation opposition to the Bill was in no sense a factious one. They merely desired to protect the interests of the borough. If their wishes were met in a reasonable spirit, their opposition would disappear. A resolution was passed to oppose the Bill.

Inspection of the System by Local Authorities.

Last Tuesday, a large party, including a number of representatives of the Local Authorities of West Bromwich, Oldbury, and Smethwick, and several gentlemen from other centres, and managers of gas-works, paid a visit to the works of Messrs. Brunner, Mond, and Co., at

GAS AND WATER COMPANIES' STOCK AND SHARE LIST.

Referred to on p. 742.

Issue.	Share.	When ex-Dividend.	Dividend or Dividend & Bonus.	NAME.	Closing Prices.	Rise or Fall in Wk.	Yield upon Investment.
£			p.c.	GAS COMPANIES.			£ s. d.
590,000	10	Oct. 12	10½	Alliance & Dublin 10 p.c.	19½—20½	..	5 5 0
100,000	10	,,	7½	Do. 7 p.c.	13½—14½	..	5 3 5
300,000	100	Jan. 2	5	Australian 5 p.c. Deb. .	99—101	..	4 19 0
200,000	5	Nov. 14	6	Bombay, Ltd. . . .	6—6¼	..	4 12 4
40,000	5	,,	6	Do. New, £4 paid	4¼—4¾	..	5 6 8
380,000	Stk.	Feb. 14	12	Brentford Consolidated	258—263	..	4 11 3
270,000	,,	,,	9	Do. New . . .	185—190	..	4 14 9
50,000	,,	,,	5	Do. 5 p.c. Pref. .	128—132	..	3 15 9
159,375	,,	Dec. 13	4	Do. 4 p.c. Deb. .	113—116	..	3 9 0
220,000	Stk.	Mar. 14	10	Brighton & Hove Orig.	222—227*	..	4 8 1
226,320	,,	,,	7	Do. A. Ord. Stk. .	157—162*	..	4 6 5
1,022,500	Stk.	Feb. 27	5	Bristol, 5 p.c. max. .	121—123	..	4 1 4
420,000	20	Sept. 28	10	British.	40—42	..	4 15 3
50,000	10	Feb. 28	12	Bromley, Ord. 10 p.c. .	24—26	..	4 12 4
79,000	10	,,	9	Do. 7 p.c. . . .	19—21	..	4 5 8
500,000	10	Oct. 12	6	Buenos Ayres (New) Ltd.	8¼—8¾	+¼	6 17 2
220,000	Stk.	Dec. 28	4	Do. 4 p.c. Deb.	97—100	..	4 0 0
150,000	20	Mar. 14	8¼	Cagliari, Ltd. . . .	22—24*	..	6 17 6
100,000	10	Sept. 28	8	Cape Town & Dis., Ltd.	14—15	..	5 6 8
50,000	50	Nov. 2	6	Do. 6 p.c. 1st Mort.	53—55	..	5 9 1
550,000	Stk.	Oct. 12	12½	Commercial Old Stock	278—283	+1	4 10 1
236,425	,,	,,	9½	Do. New do. .	210—215	+2	4 10 8
238,237	,,	Dec. 13	4½	Do. 4½ p.c. Deb.	132—137	..	3 5 8
800,000	Stk.	Dec. 13	9	Continental Union, Ltd.	163—168	+1	5 7 2
200,000	,,	,,	7	Do. 7 p.c. Pref.	163—168	+3	4 3 4
575,000	Stk.	Feb. 28	5	Crystal Palace Ord. 5 p.c.	115—120	..	4 2 0
60,000	,,	,,	5	Do. 5 p.c. Pref.	127—132	..	3 14 1
486,090	10	Jan. 31	11	European, Ltd. . . .	19½—20½	+½	5 7 4
354,660	10	,,	11	Do. £7 10s. paid	14½—15½	+½	5 6 5
15,079,885	Stk.	Feb. 14	4⅛	Gas-light and Coke	4 p.c. Ord. . .	95—97	−1	4 10 8
2,600,000	,,	,,	3⅜		3½ p.c. max. .	91—93	+1	3 15 3
3,799,735	,,	,,	4		4 p.c. Con. Pref.	113—116	..	3 9 0
4,063,425	,,	Dec. 13	3		3 p.c. Con. Deb.	93—95	..	3 3 10
70,000	10	Oct. 26	8	Hongkong & China, Ltd.		13½—14½	..	5 10 4
3,800,000	Stk.	Nov. 14	10	Imperial Continental .		212—217	..	4 13 11
473,600	Stk.	Feb. 14	3½	Do. 3½ p.c. Deb. Red.		100—102	..	3 8 8
561,000	Stk.	Feb. 28	10	Liverpool United A .		234—236	+7	4 4 9
678,100	,,	,,	7	Do. do. B .		170—173	+1	4 0 11
306,083	,,	Dec. 28	4	Do. do. Deb. Stk.		120—122	..	3 5 7
75,000	5	Dec. 13	6	Malta & Medn., Ltd. .		4½—5	..	5 14 3
560,000	100	Oct. 1	5	Met. of	5 p.c. Deb.	106—109	..	4 11 9
250,000	100	,,	4½	Melbourne	4½ p.c. Deb.	104—106	..	4 4 11
541,920	20	Nov. 14	3½	Monte Video, Ltd. . .		9½—10½	..	6 13 4
717,946	Stk.	Feb. 22	8½	Newc'tle & G'tesh'd Con.		225—227	..	3 14 11
312,855	Stk.	Dec. 28	3½	Do. 3½ p.c. Deb.		101—102	..	3 8 8
150,000	5	Nov. 29	8	Oriental, Ltd. . . .		7—7⅛	..	5 6 8
135,000	5	,,	8	Do. New, £4 10s. pd.		5⅞—6¼	..	5 15 3
15,000	5	,,	8	Do. do. 1879, £1 pd.		1¼—1⅝	..	4 11 5
					*Ex. div.		

Issue.	Share.	When ex-Dividend.	Dividend or Dividend & Bonus.	NAME.	Closing Prices.	Rise or Fall in Wk.	Yield upon Investment
£			p.c.	GAS COMPANIES.			£ s. d.
60,000	5	Feb. 28	7	Ottoman, Ltd. . . .	5¼—5⅝	..	6 1 9
851,070	10	Oct. 12	7	River Plate Ord. . .	10¾—11¼	..	6 4 5
250,000	Stk.	Dec. 28	4	Do. 4 p.c. Deb. .	97—99	..	4 0 10
250,000	10	Sept. 28	8	San Paulo, Ltd. . . .	11—12	..	6 13 4
135,000	Stk.	Sept. 14	10	Sheffield A	232—236	..	4 4 9
209,984	,,	,,	10	Do. B	232—236	..	4 4 9
523,498	,,	,,	10	Do. C	232—234	..	4 5 6
5,761,885	Stk.	Feb. 14	5	South Met., 4 p.c. Ord.	129—132	−1	3 15 9
1,547,965	,,	Jan. 16	3	Do. 3 p.c. Deb. . .	93—96	..	3 2 6
380,940	Stk.	Nov. 14	5	Southampton Ord. . .	105—110	..	4 10 11
70,825	,,	Jan. 16	4	Do. 4 p.c. Deb.	105—110	..	3 12 9
120,000	Stk.	Feb. 28	6	Tottenham and	A. 5 p.c.	112—117	..	5 1 8
250,520	,,	,,	4¾		B. 3½ p.c.	84—89	..	5 0 0
80,100	,,	Dec. 13	4	Edmonton	4 p.c. Deb.	109—114	..	3 10 2
182,380	10	Jan. 16	5	Tuscan, Ltd.		8—9	..	5 11 1
149,900	10	Jan. 2	5	Do. 5 p.c. Deb. Red.		97—102	..	4 18 0
230,000	5	Feb. 28	9	West Ham, 10 p.c. . .		9—10	..	4 10 0
147,000	10	,,	6	Do. 7 p.c. . .		11½—12½	..	4 16 0
128,984	Stk.	Dec. 28	4	Do. 4 p.c. Deb		108—113	..	3 10 10
				WATER COMPANIES.			
780,499	Stk.	Dec. 28	11	Chelsea, Ord. . . .		298—303	..	3 12 7
150,000	,,	,,	5	Do. 5 p.c. Pref. .		155—160	..	3 2 6
160,000	,,	,,	4½	Do. 4¼ p.c. Pref. '75		142—145	..	3 2 1
175,785	,,	Sept. 28	4½	Do. 4½ p.c. Deb. .		143—148	..	3 0 10
1,720,560	Stk.	Oct. 12	7	East London, Ord. . .		190—195	..	3 11 10
654,740	,,	Dec. 13	4½	Do. 4½ p.c. Deb. .		145—150	..	3 0 0
797,687	,,	,,	3	Do. 3 p.c. Deb. .		95—97	..	3 2 6
700,000	50	Dec. 13	8	Grand Junction	10 p.c. max. .	108—111	..	3 12 1
310,000	Stk.	Sept. 28	4		4 p.c. Deb. .	125—130	..	3 1 7
708,000	Stk.	Feb. 14	14	Kent		300—305	..	4 12 5
160,000	,,	,,	7	Do. New, 7 p.c. max. .		200—205	..	3 8 4
1,043,800	100	Dec. 28	10½	Lambeth, 10 p.c. max. .		280—285	..	3 13 8
406,200	100	,,	8	Do. 7½ p.c. max. .		208—213	..	3 15 1
350,000	Stk.	Sept. 28	4	Do. 4 p.c. Deb. .		125—130	..	3 1 7
500,000	100	Feb. 14	13¾	New River, New Shares		408—413	−2	3 6 7
1,000,000	Stk.	Jan. 31	4	Do. 4 p.c. Deb. .		127—130	..	3 1 7
902,300	Stk.	Dec. 13	7	South-wark and Vaux-hall	Ord. . . .	188—193	−2	3 12 6
126,500	100	,,	7		7½ p.c. max.	175—180	..	3 17 9
489,200	Stk.	,,	5		5 p.c. Pref. .	155—160	..	3 2 6
1,019,585	,,	Oct. 12	4		4 p.c. A Deb.	125—130	..	3 1 7
1,155,066	Stk.	Dec. 13	10	West Middlesex. . .		278—283	..	3 10 7
200,000	,,	,,	4½	Do. 4½ p.c. Deb. .		140—145	..	3 2 1
200,000	,,	Mar. 14	3	Do. 3 p.c. Deb. .		66—98*	..	3 1 3
						*Ex. div.	

Winnington, near Northwich, to inspect the extensive plant employed there for the manufacture of Mond gas. The visit was initiated by Mr. A. M. Chance, in conjunction with the other promoters of the scheme, which is now figuring so conspicuously in the Midlands. Our readers are, of course, aware that though Mond gas has only lately sprung into prominence, the product is by no means a new one. As far back as 18/9, Dr. Ludwig Mond, whose name is so well known in the world of chemistry and of invention, commenced a series of experiments with a view to the manufacture of a good, clean gas from bituminous fuel, and the recovery of the ammonia contained in that fuel, which valuable product had been largely wasted under other processes. He put up plant for the purpose adjacent to the important alkali works at Northwich, and altered and very extensively improved it from time to time. Within the past ten years, he has entirely reconstructed it; and he claims now to be able to so gasify any ordinary slack as to extract something like 80 per cent. of its total heating power, in the form of a clean gas suitable for the purposes of any manufacture in which gas can be utilized for producing heat or power. From every ton of common slack he can make, as he says, from 140,000 to 160,000 cubic feet of producer gas, having a calorific value of 150 British thermal units per cubic foot, or nearly one-fourth the value of ordinary coal gas. He claims to be able to supply heating power in this form equivalent to that of ordinary coal gas at a considerably reduced price. In the course of his process, he extracts from the slack ammonia to the value of about 8s. per ton of fuel consumed. His plant is so arranged as to economize heat as far as possible; the heat given off by the cooling of the gas being utilized in helping to raise to the required temperature the blast of hot air and steam used for its production. A quantity of this steam is decomposed in the producer; thus providing a large volume of hydrogen gas, while the excess steam is regenerated and again used for the hot blast. The process is thus a cyclical one. The gas has not been extensively used outside Messrs. Brunner, Mond, and Co.'s works; but the Northwich Electric Supply Company, whose premises are situated about a mile from the producing station, are running all their dynamos by it. It is also being employed in glass-works, where an exceedingly high temperature is required; and several important engineering firms in other parts of the country are, it is stated, laying down producing plant with a view to adopting the process in their works.

The party journeyed to the Hartford Station, on the London and North-Western Railway, a drive of a couple of miles from which brought them to the village of Winnington. Under the guidance of Messrs. Alfred Mond, Schweich, Charles Humfrey, H. A. Reid, and H. A. Humphreys, the visitors were conducted all over the section of the alkali works containing the Mond plant, and the various processes were lucidly explained to them. Interest first centred around the huge cylindrical producers, of which there are twelve, with a capacity for gasifying 240 tons of slack per day. The charging is all carried out mechanically. The purifying apparatus, in which the gas is thoroughly washed and freed from tar and dust by contact with a spray of water, was next inspected; and then the recovery plant, by which the ammonia is extracted. Perhaps the most interesting feature of the works to the visitors was the engine-shed. Here there were a number of gas-engines, all run by Mond gas, and of a total of no less than 1200-horse power. In two directions at least the Company have established a record in regard to their gas-engines. They possess the largest in the country—a magnificent "Premier"—of 650 indicated horse power; while another of their engines, of 150 indicated horse power, has been running day and night since the 25th of September. They regard this as a vindication of their claim that Mond gas, in view of its cleanliness and purity, is an absolutely ideal fuel for consumption in gas-engines. The second adaptation of the gas which was demonstrated was in the working of a range of 14 furnaces, at different temperatures, for purposes of chemical manufacture. All these, it was noted, were being attended by one man. A general feature of the works which impressed everybody familiar with the great factories of the Black Country was the almost entire absence of smoke.

ELECTRIC LIGHTING NOTES.

The Town Clerk reported to the Harrogate Town Council on Monday last week that the Local Government Board had sanctioned a loan of £10,000 for electric lighting purposes.

The Electricity Committee of the Bradford City Council are recommending to-day the acceptance of tenders in connection with the Valley Road new electricity station, amounting to £21,937.

The annual accounts of the Electric Light Department of the Walsall Town Council show a profit of £119 8s. 5d., as against £61 13s. 5d. in the previous year. The progress made is certainly not remarkable for its rapidity.

Darlington is getting its electric lighting by instalments. In December the current was turned on to the private consumers. About three months later (or to be exact yesterday week), the Mayoress pressed a button on the balcony of the Town Hall, and forty arc lamps responded with light. A large crowd assembled to witness the marvellous sight.

The report of the City of London Electric Lighting Company was issued last Thursday, but, despite an income of, roughly speaking, a quarter of a million, there is no dividend for the ordinary shareholders. Other details show that though the Company have perhaps the finest field for development, there is little that is satisfactory in regard to the undertaking. In three years the expenses have doubled—viz., from 31 per cent. in 1897 to 61·13 per cent. for the past year. The customers have increased by 3533, and the number of lamps has augmented by quite 200,000. Coal has advanced; and the price per unit has been reduced from 7·3d. in 1897 to 4d. last year. These facts may account for the results shown by the report.

The Consulting Electrical Engineer to the Lowestoft Town Council (Mr. Hawtayne) has presented them with a scheme for extending the electric light to all parts of the town, so as to furnish them with an

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DAY.

Dublin, March 17th.

expensively acquired backbone for their business. The scheme includes the providing and connecting of 526 new posts, of which 200 would be fitted with 32-candle power lamps, and 386 with 16-candle power lamps with six switching-points, complete with all accessories. The cost is estimated at £9550. The annual cost of lighting under the scheme, including interest and sinking fund at the rate of 5¼ per cent. on the capital, is £1836 17s., or £2 14s. 6d. a year for each 16-candle power lamp, and £3 18s. 6d. per annum for each 32-candle lamp. In this scheme it is assumed that all lamps are lighted every night throughout the year from dusk to dawn. Will experience confirm these figures?

At the meeting of the Court of Common Council of the City of London last Thursday, a month's notice, under their Electric Lighting Order, was received from the Charing Cross and Strand Electricity Supply Corporation, Limited, of their intention to open all the principal streets in the central portion of the City for the purpose of laying cables, &c. The Company had previously made similar application for the southern district of the City. During the last six months, the Company have made such good progress with their works that the whole of the western portion has been cabled, and consumers of current are being supplied off the mains from the Ludgate Hill sub-station. Considerable progress is also being made with the erection of the Fenchurch Street sub-station for supplying the eastern portion of the City. Notwithstanding this, the reading of the notice above referred to caused the countenances of the worthy City Fathers to look anything but cheerful; and more than one Common Councilman heard the Town Clerk's statement with a groan, as he thought of the "earthworks" which would at no distant date be prominent features in the principal City thoroughfares.

The residents of the pretty little town of Shanklin, in the Isle of Wight, are much exercised over the problem of the public lighting of the place. But if the figures published, in exceptionally striking characters, in a local paper do not enable them to solve it in favour of gas, no amount of argument will do so. Put concisely, the Electric Light Company offer 6070-candle power for £422 10s.; the Gas Company 17,070-candle power for £427 10s. per annum. Consequently, they will supply nearly two-thirds more light than their rivals at £5 more expense. The greatest quantity of light which the Electric Light Company offer to provide is equal to 16,250 candles; the price per annum being £512 10s. It will be seen that the Gas Company will furnish more light than this at £85 less cost. Moreover, they offer to accept a contract for three years, without any reservation; whereas the Electric Light Company make conditions which considerably detract from the value of their tender. Nevertheless, at a public meeting held at the Institute last Tuesday to consider the question, a resolution in favour of electricity was carried by 50 votes against 28 for an amendment that no contract should be entered into with the Electric Light Company until the ratepayers had been polled on the subject.

Electric light farming is becoming ubiquitous; and the authorities of many small towns—desirous in their limited way of being on a level with the larger municipalities in this respect, but fearing to face the immediate responsibility—readily fall into the net. Their numbers are growing; and one of the latest to take this easy route into the alluring realms of electric lighting is the Farnham District Council. The idea is that Edmondson's Electricity Corporation are to carry out the works, and be paid for them by the Council in the ordinary way. The Electricity Corporation will then lease them for fourteen years at a rent equivalent to the annual amount required for interest and sinking fund upon the necessary loan; the Council to have the option of determining the lease at the end of seven years upon payment to the Corporation of 15 per cent. upon the amount of capital expended The Council have decided to proceed in the matter after assuring themselves of the Corporation's financial stability. Perhaps at the same time it would be well if the Council obtained estimates for carrying out the work from different quarters, and compared them with the estimate of the Corporation. They may be sure Edmondson's or any other electrical company do not work with the one pious object of carrying light to those who are dissatisfied with the present system of illumination, and above all pay a price for the privilege of doing so.

The Sudbury (Suffolk) Town Council have at length felt who are the masters and who the servants in local matters—particularly in those in which the public purse is affected. From the first the promoters of the (for such a town) outrageously expensive electric lighting scheme, the success of which was so visionary, set their faces against consulting the ratepayers in an open manner; and from the first in these "Notes" it was urged that, under the poor circumstances of the town, to take counsel with the ratepayers at large was the only right and fair course to pursue. The promoters, however, fancying themselves clothed with despotic power, lightly swept all objections behind them, and went their way; but the time came when the first estimate of cost was raised considerably (which is the common experience), through changes in the suggested scheme. Then some of the ratepayers who had been lethargic began to look into the matter, and saw things in a new light, with the result that two public meetings have been held, at which protests against the scheme have been uttered in a no uncertain voice; and the promoters—no doubt after much internal wrestling and swallowing of pride—saw that they must pay respectful attention to the feeling of the ratepayers. One particularly interesting feature in the course of events which led to the death of this unpromising scheme was the changed attitude of that quondam supporter and advocate of the scheme, Alderman Mauldon; and at the second public meeting yesterday week, his voice was one of the loudest against proceeding in the matter at the enhanced price. On the same occasion, a letter was read from the Mayor (Mr. F. Wheeler), in which he said that, should the scheme be abandoned, he laid the responsibility for the costs already incurred on those who, until a recent date, supported the scheme. That, it may be remarked, is a light responsibility compared with the responsibility of going forward with the scheme. As the Mayor and his supporters were so positive of success, it is a pity they did not announce their willingness to bear the little responsibility of indemnifying the town against loss. If they had done this, then no harm would have resulted from Sudbury trying the electric light. But they did not make the offer. On the contrary, they took the very wise

MAURICE GRAHAM.

THE "GRAHAM"

HOT-COKE

"SECOND

Now working at the

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SOLE MAKERS:

course last Tuesday of bringing the matter before the Town Council; and it was agreed to withdraw the application to the Local Government Board for a loan. In a telegraphic message, Mr. Hawtayne, the Electrical Adviser, besought the Council to merely postpone the inquiry until the matter could be fully discussed at a meeting to be attended by him. But the Council seemed to be very glad to get rid of the matter; and a little later they decided to negotiate for the transference of the Provisional Order to a Company. It began to look as though wisdom had entirely departed from the midst of the governing body of the town; and it is a relief to find it is not so. But the intellect of some of the leaders appeared to have got into quite a disordered state over this electric lighting question; and it required a shock to bring them back to a reasonable way of thinking. That shock, fortunately, the ratepayers have given them. Now the Mayor and his colleagues should show their faith by forming a Company and sinking their money in this enterprise which was to shower such bountiful blessings and profits on the town under the rule of the Local Authority, financed from other sources than the councillors' private pockets.

At the Westminster Town Hall, last Tuesday, Sir Courtenay Boyle resumed the inquiry he is holding, by direction of the Board of Trade, into the effect of the proposed alteration in the regulations for ensuring a proper and efficient supply of electricity. The previous proceedings have been already noticed (*ante*, pp. 636, 704). Mr. Danckwerts, K.C., on behalf of the City Corporation, said it appeared from the existing regulations to be perfectly open to the electric light companies to have one set of mains at one pressure and another set at a different pressure. There was nothing which made necessary a change in the consumers' pressure, and the application of the companies really amounted to a question of convenience or saving of expenditure of capital. In the case of large buildings, there could be no difficulty in having transformers by which to reduce the pressure; and in the case of smaller consumers, they might group them and use a transformer for the group. Even if it were right to make the change, ought it, he asked, to be made irrespective of the number of consumers who were holding out? He submitted that it should not, though he could conceive that where about a dozen consumers at the lower pressure were standing in the way of a considerable improvement, there was a case for the intervention of the Board of Trade to say whether the change should be forced on the consumers, or whether the company should use means such as transformers to supply these parties. In the City of London there were 4500 consumers who came within the scope of the proviso that the change could be made only with consent. In such a case as that, why, purely for the convenience of the suppliers, should the change be forced upon the consumers? There should be a limitation, to be determined by some authority, as to whether or not the proviso should be dispensed with. It should always be remembered that the Westminster, Chelsea, and Glasgow people had never found any difficulty in working, notwithstanding the existence of this proviso. In no case ought the consumers to pay the costs of the change. Sir Courtenay Boyle at this stage said he had a suggestion to make, and he put it forward without in the least wishing to pronounce any decision or to prejudice any of the parties. He submitted the following proviso, to be substituted for the one existing: "Provided that no change shall be made in the pressure of the supply to any premises which on . . . were supplied with energy by the undertakers, except with the consent of the consumer; but, where the consumer withholds his consent after the undertakers have offered to pay the reasonable costs of, or incidental to, the change, the undertakers may appeal to the Board of Trade, and that Board may, if they think fit, dispense with the consent of the consumer, on such conditions as the Board impose. The Board of Trade may, if they think fit in any case, refer to the arbitration of a single arbitrator appointed by them the question of the conditions to be imposed under this provision. The arbitration shall be subject to the provisions of the Arbitration Act, 1889, as if the arbitration were pursuant to a submission, and shall also be subject to the like provisions as an arbitration in pursuance of a Special Act under Part I. of the Board of Trade Arbitrations, &c., Act, 1874." After some discussion, the inquiry was adjourned, to allow of the parties exchanging amendments, and forwarding them to the Board of Trade. At the resumption of the inquiry on Thursday, Mr. Littler, K.C., objected to the wording of the proposed clause on behalf of two large consumers; contending that, as a condition of his clients' consent to the alteration, they should be placed in the same position pecuniarily as if the change, which they neither desired nor liked, had not been made. The Hon. A. Lyttelton, K.C., on behalf of the London County Council, agreed with Mr. Littler; and both he and Counsel for the Corporation of London submitted amendments to the clause which, they contended, ought to meet the views of all concerned. Sir Courtenay Boyle said he had very little doubt that he should be able to give such information to the Board of Trade as would enable them to settle the clause; but if Counsel for the opponents were of opinion that the proposal would raise a controversy in which electric lighting authorities differed, he had better hear the evidence for the opposition. Counsel consulted together, after which the Hon. A. Lyttelton informed Sir Courtenay that they were unable to agree; and the evidence was then proceeded with. One of the witnesses called was Professor Ayrton, Secretary of the Central Technical College, who said that from tests he had made he found that the light had been diminished by a change from 100 to 200 volts. He would not suggest that there were no efficient 200-volt lamps on the market; but the tests he had made afforded evidence that manufacturers were selling a large number of inefficient lamps. He believed, however, that the difficulty in the manufacture of 200-volt lamps would be overcome. The inquiry was again adjourned.

Walsall and Mond Gas.—Without discussion, a special report of the Parliamentary Committee on the Mond Gas Bill was adopted by the Walsall Town Council yesterday week. It stated that the Committee had petitioned against the Bill with the object of compelling the Company to sell to the Corporation in bulk, leaving the Corporation to take all necessary precautions for purifying and distributing the gas to consumers at the lowest possible price.

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LONDON COUNTY COUNCIL AND THE WATER QUESTION.

The First Meeting of the newly-elected Council for the Administrative County of London was held last Tuesday, in the County Hall, Spring Gardens. At the commencement of the proceedings, Mr. W. H. Dickinson, the Chairman of the late Council, presided. The business was opened by Mr. Burns proposing Mr. A. M. Torrance as Chairman; and the motion was carried unanimously. Subsequently, Mr. M'Dougall was appointed Vice-Chairman, and Lieut.-Col. Rotton Deputy-Chairman.

Mr. M'Kinnon Wood, Chairman of the Water Committee of the previous Council, submitted the following motion: "That, in view of the decisive verdict of the electors of London in favour of the Council's water policy, a deputation be appointed to urge upon the President of the Local Government Board that the Government should allow the Council's Purchase Bill to pass second reading and to be referred to a Committee of Parliament." He said he hardly supposed the Council would be astonished at the terms of his motion. There had in the past been a good deal of controversy as to what was the opinion of London on the water question; but there could now, he thought, be no doubt that the Progressives had received a clear mandate from the ratepayers on the subject. He did not know whether or not members who sat opposite were prepared to accept the verdict, and go with them to the President of the Local Government Board; but, at any rate, the duty of the Progressives was clear. They had a definite and decisive mandate in favour of their policy, and they were bound to go to the Government and ask that their Bill might go forward. The recent election had decided that the people were determined not to wait any longer for the settlement of this question, and that they desired to have control of the water supply. It was idle to talk about new-fangled schemes of Water Boards and Trusts, for none of them would satisfy London.

Mr. Cornwall seconded the motion. He said the Council had for years fought on the London Water Question, and time had proved that the case again and again put forward by them was the right one.

Mr. Campbell criticized the action of the Progressives at the late election, and declared that they put false issues on the water question before the electors, who were ignorant of the recommendations of the Royal Commission. He moved, as an amendment—"That, under all the circumstances, the proposed action would be useless and impolitic; that trying to again force upon the Government the views held by a majority of previous Councils as against the unanimous recommendations of the late Royal Commission, which have not yet been finally considered by the Government, would only add to the already great waste of the ratepayers' money; and that this Council considers no further action should be taken till the proposals of the Government shall be announced, as promised, in 1902."

Mr. Fletcher seconded the amendment.

Mr. Cousins said he was strongly in favour of the purchase and public control of the water supply; but, in the interests of the largely-increased population outside London, the Council had no right to demand that it should manage the entire supply. The whole difference between the parties was as to who should be the water authority.

Mr. Dickinson said he did not believe any other municipality in England had been treated with such unfairness and indignity by Parliament as had been the London County Council on the water question. It was only fair, after the verdict of the recent election, that the Council's policy should be allowed to be considered by a Parliamentary Committee.

Mr. Antrobus pointed out that only a week ago, in answer to a question, Mr. Long had stated in the House of Commons that he saw no reason to alter the views he had already expressed in regard to this question. He (Mr. Antrobus) did not believe the Government would budge on the subject, even after recent events, because they knew well that the verdict of London in favour of the Progressives had not been given on their water policy.

Mr. Stuart said the Council claimed that they were the proper people to conduct the negotiations for the transfer of the undertakings of the Water Companies; and he contended that there was no possibility of carrying out the purchase otherwise than through the Council.

Mr. R. A. Robinson denied that the people of London had given a decisive verdict in favour of the Council's water policy. In approaching Parliament, they would very likely be told that the decisive verdict was in regard to the Companies' regulations.

Sir A. Arnold declared that, among the issues raised at the Council election, the one to which the electors attached great importance was that affirmed by the resolution.

The Hon. W. Peel, M.P., was convinced that before the last election the Moderate party were absolutely committed to the question of purchase, and he was equally convinced that this was not the question on which the election turned, but rather that of the new regulations. He could not believe that any Government, Unionist or Liberal, would allow a Bill such as that proposed by the Council, which neglected the interests of the outside authorities, to pass.

Mr. J. Burns supported the recommendation, and remarked that all the issues in this question pointed to the desirability of the Council purchasing the undertakings of the Water Companies, managing them, and using the profits in the reduction of the rates or in the improvement of the supply.

On the amendment being put, only a few hands were held up in its favour. The Progressives challenged a division, whereupon a number of the Moderates left the chamber. The division resulted as follows: For the amendment, 7; against it, 91—majority against, 84. The motion was then carried.

Winsford District Council and the Gas-Works.—The Winsford District Council last Wednesday decided to purchase the undertaking of the Over and Wharton Gas Company for £15,862. It was resolved to apply for a loan, extending over thirty years, of £17,500.

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NOTES FROM SCOTLAND.

From Our Own Correspondent.

Saturday.

The proposed transfer of the undertaking of the Carnoustie Gas Company to the Corporation has come to nought; the promoters having failed to secure a two-thirds majority in the Town Council. The subject was discussed by the Town Council in Committee on Wednesday night. The offer of the Council was £10,919; the Company stated their willingness to accept £12,000. After receiving the communication from the Directors containing their terms, the Town Council again consulted Mr. J. M'Gilchrist, of Dumbarton, and asked him if he had anything to say for the guidance of the Council. Mr. M'Gilchrist replied that he was pleased to know the Council had made such a full and fair tender as £10,919 for the undertaking. The councillors could never be blamed with attempting to confiscate the Company's property. The value in the open market—judging from the price paid in a recent sale of the Company's shares—gave a much lower figure. Under all the circumstances, he thought that the Council should repeat their tender. In the event of the Company again rejecting it, it would be necessary for the Council to seriously consider whether it would not be better to delay adopting the Act until the Company put their works into something like order. They had "a lot to do." They had not even a manager's house. The policy adopted was to move that the Burgh Gas Supply Act be adopted, which would have the effect of allowing the ratepayers a say in the question of transfer or no transfer, and would also fix that the transfer should go on, compulsorily if necessary, instead of in the amicable way hitherto followed. In support of this course, Bailie Winter said he supposed the Directors of the Company felt that £12,000 was as little as they could expect for the works. As regarded the position of the Town Council as purchasers, he thought they could make the works pay at the sum offered. Complaints were sometimes made about the quality of the gas, and of its dearness; and if the Council had the works in their own hands, both these things could be remedied as far as possible. Regarding the amount to be borrowed, he understood that they could obtain £12,000 over 40 years at 3½ per cent. interest, which would cost them about £560 a year. The average profit of the Company for the past five years was £581, after laying aside a sum averaging £166 for depreciation. The difference in favour of the Council would be £21; so that they could turn out gas cheaper than they had been getting it during past years. He estimated that, purchasing the undertaking for £12,000, expending £4000 upon the works, and meeting interest and redemption of loan, the Corporation would have to face an annual outlay of £745, as against £968 should they allow the Company to expend the £4000 now, and have to take over the undertaking, say, three years hence. The counter-motion was that the Act be not adopted; and the argument in support of it was that, with the prospective outlays, there would be little chance of the Corporation being able to reduce the price of gas. Not a word was said about accepting the terms of the Company, or refusing them; but as only four voted for adoption of the Act, and five voted against, the result is held, in terms of a reservation in the Council's offer, to be that no further negotiations are to take place on the subject. It is a pity that the friendly method has broken down, especially seeing that there was little more than £1000 between the parties, which should not have been an insuperable barrier to an agreement being come to. It is evident that the community are not ripe for a transfer, whatever the terms might be, unless, probably, they should be ridiculously low; and it is likely that, after this abortive movement, the attempt to procure a transfer will not be renewed for a long time.

The Directors of the Bo'ness Gas Company have intimated that they are prepared to treat with the Council in the matter of the proposal to acquire the undertaking. They are prepared to consider an offer of £35,000. They are also quite willing to give every facility to an expert to value their works. A small Committee of the Directors has been appointed to carry on the negotiations, and engage an expert valuer on behalf of the Company. This is an unusually friendly attitude for a Gas Company to take up at the beginning of such negotiations. To be sure, the price asked does not betoken an intention on the part of the Directors to give away their undertaking; and it is just possible it may be found so stiff that no further proceedings will follow.

It is reported that, while the Corporation of Cowdenbeath have been making up their minds as to whether they will acquire what remains of the local Gas Company, or adopt an electric lighting scheme or other form of illumination for the place, the Gas Company have sold their undertaking to a new Company, who will, in the event of the shareholders approving the sale, at once prepare to make coal gas.

It is too soon to say whether or not anything will come of the movement, but at a meeting of the Gas Committee of the Dundee Town Council on Wednesday, it was remitted to a Sub-Committee to obtain information with a view to taking action in the matter of the quality of the coal supplied to the gas-works. At the meeting it was urged that defaulters should be dealt with. It may be that the matter is in order; but I feel as if this movement is being forced on by members of the Corporation, at their own instigation, and not at the instance of the officials, unless it be founded upon reports by the Analyst whom the Corporation appointed some years ago as an independent officer. When the appointment was fixed, I expressed my opinion, strongly, that it was a mistake to make it independent of the Gas Manager. It looks as if my anticipations were coming true; for if any objection is to be taken to the quality of the coal supplied, it should come, not from any theorist or experimentalist, but from the man who has to produce the results. Suppose coal should not be up to laboratory tests (and what coal is?), if the Manager is satisfied, who has an interest in raising objections to it? There is a give and take in such matters which every manager understands, and which ought not to be left out of account. To proceed upon the report of an analyst when the manager makes no complaint, is to introduce a finical element into the working of corporation gas undertakings which does not make for good.

At a meeting of the Dunfermline Gas Commissioners this week, the

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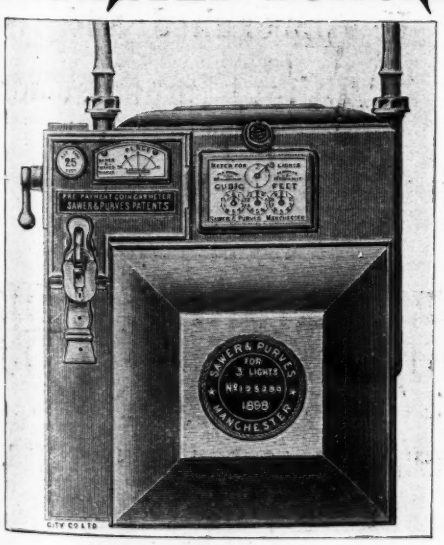

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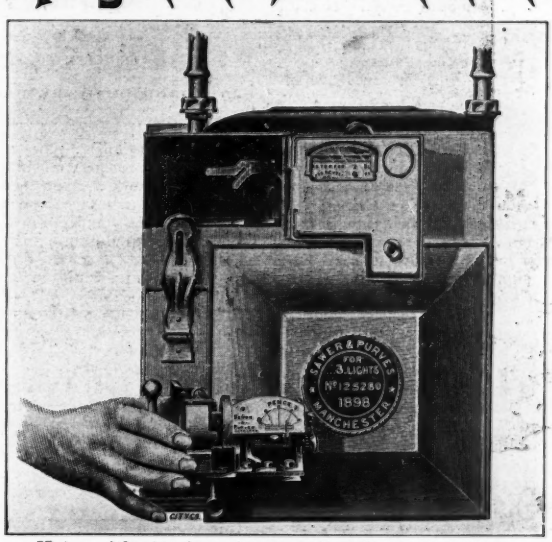

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Works Committee reported that the Engineer (Mr. A. Waddell) had recommended that, in the interests of the gas undertaking, six lamps in High Street should be fitted up with 1000-candle power high-pressure incandescent gas lighting apparatus, as an experiment, and to let the public see that gas-lamps as good as electric arc lamps can be provided, at half the cost. After a conference with the Lighting Committee of the Town Council, it was resolved to sanction the experiment, which is to be arranged immediately.

The Directors of the Pitlochry Gas Company have this week approved of plans prepared by Mr. R. S. Carlow, of Arbroath, for the extension of the works. The cost is estimated to be about £1500. A feature of the scheme is the placing of the retort-house alongside the railway, whereby it will be possible to make use of an embankment for taking delivery of coal.

At a meeting of the Town Council of Largs this week, a report as to the augmentation of the water supply, prepared by Mr. W. Copland, of Glasgow, was read. This stated that, by extending the existing reservoir at Middleton, but without raising its banks, 1,330,000 gallons of extra storage would be secured, at a probable cost of £1010. By raising the banks of the reservoir 3 feet, 6,000,000 gallons would be secured, at a cost of £4400; while by raising them 5 feet, 16,000,000 gallons would be secured, at a cost of £6800—on the assumption that the puddling of the old banks would suffice. If it did not, the cost might be £8000. The estimated cost for a new reservoir at Outerwards, further up the glen, to give storage for 44,000,000 gallons, was £8000.

The Town Council of Arbroath have, in connection with their scheme for augmenting the pumped water supply of the town, got themselves into a position of some difficulty, and which there is every probability it will cost them a good deal to get out of. The construction of the underground workings has just been, or is being, completed by the Contractors (Messrs. John Paterson and Son, Limited, of Glasgow). What may be taken as an official account of the situation states that "The Water Committee had under consideration on Tuesday evening a report from their Engineer (Mr. M'Culloch), with regard to the account of the Contractors for work executed in connection with the water extension scheme at Nolt Loan. The account rendered was £12,518 7s. 11d., less £5000 paid; the balance claimed being £7518 7s. 11d. Mr. M'Culloch has analyzed the claim; and he reports that the amount of work done was £5169 1s. 6d. in place of £12,518 7s. 11d., and, moreover, that there falls to be deducted from the £5169 1s. 6d., a sum of £3680 0s. 9d. in respect of work not having been executed in conformity to the contract, or not executed at all, and in respect of delay in execution—leaving £1489 0s. 9d., as the gross sum to which the Contractors are entitled. But as they have already received payments to account, under all reservations, amounting to £5000, the Commissioners, Mr. M'Culloch says, are entitled to repayment from the Contractors of £3510 19s. 3d." The position of matters, therefore, is that the Contractors claim payment from the Commissioners of £7518 7s. 11d.; while, on the other hand, according to Mr. M'Culloch's report, the Commissioners are not only not bound to pay any portion of this sum, but are entitled to repayment from the Contractors of £3510 19s. 3d.

CURRENT SALES OF GAS PRODUCTS.

LIVERPOOL, *March* 16.

Sulphate of Ammonia.—Throughout the week the market has been depressed at all points, to some extent owing to the lateness of the season, but mainly through the arrival unsold of large speculative consignments at Spanish ports, and consequent forced selling on those markets. The closing quotations are £10 12s. 6d. f.o.b. Hull, £10 15s. f.o.b. Liverpool, and £10 17s. 6d. f.o.b. Leith. There has again been good inquiry in the forward position, right up to the autumn months, but buyers' views are scarcely above prompt values, and while makers altogether refuse to sell ahead unless at a substantial premium, speculators are shy about taking the business at prices obtainable.

Nitrate of Soda is firm at 8s. 4½d. to 8s. 7½d. per cwt., according to quality, on spot.

LONDON, *March* 16.

Tar Products.—There is nothing fresh as regards the markets, all of which are in a very quiet state, with an absence of any important demand for early delivery. Some sales of 90 per cent. benzol are reported at about 11½d. to 1s. f.o.b. London, but continental consumers are holding off. For 50/90 per cent. there is no inquiry whatever; and it is difficult to fix its exact value. Solvent is again very quiet; the demand for home consumption having fallen away. Prices may therefore be considered as nominal as there is no business doing. As regards crude carbolic, some quantity of 60's has been sold at 2s. 6½d. f.o.b. London, early delivery. Crystals are slightly firmer; and further business is reported f.o.b. London, but only on a very limited scale. Tar oils remain in a most depressed state; and there is little or no business to report. As regards anthracene, the prices are purely nominal. The alizarine makers do not seem to take any interest in the article. Naphthalene salts continue very dull of sale; and the demand has certainly fallen away, while the supplies are coming forward rather heavily, as is to be expected at this time of year.

The average values obtaining during the week are: Tar, 14s. to 17s. 6d. Pitch, east coast, 31s.; west coast, 28s. 6d. Benzol, 90's, 10d. to 11½d.; 50's, 10½d. to 11d. Toluol, 1s. 2d. Crude naphtha, 4½d. Solvent naphtha, 1s. 1½d. to 1s. 2d. Heavy naphtha, 1s. 0½d. Creosote, 1d. Heavy oils, 1⅜d. Carbolic acid, 60's, 2s. 6d. to 2s. 6½d. Naphthalene, 92s. 6d.; salts, 60s. to 70s. Anthracene, "A," 3d.; "B," 2d.

Sulphate of Ammonia.—The market continues very dull; and there is nothing doing. The Beckton position is decidedly easier; and there is little or no doubt that the Gaslight and Coke Company will be prepared to meet the market at an early date. Liverpool is very dull indeed; and £10 15s. has been accepted prompt. As regards Leith, £10 17s. 6d. may be taken as the market value; but there does not seem to be any demand for early delivery. With regard to Hull, it is difficult to fix the value. There are sellers at £10 12s. 6d.; but consumers speak of £10 10s. prompt. In all probability, however, there will be a change in the position before the end of the month, as at present the absence of Continental business renders it difficult to fix the correct values.

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COAL TRADE REPORTS.

From Our Own Correspondents.

Lancashire Coal Trade.—The steady downward tendency of prices in all descriptions of fuel, except some of the better qualities suitable for house-fire purposes, to which reference has been made in previous reports, has of necessity compelled colliery owners to consider the probable conditions they may have to face as the summer approaches, when even house-fire coals will have lost their present firmness, and all classes of fuel are likely to be more or less plentiful on the market. So far as the general branches of the coal trade are concerned, users of fuel for iron-making, steam, and other manufacturing purposes continue for the most part to buy simply from hand to mouth; and even the substantially lower prices at which both steam and forge coals and engine fuel are now to be obtained, do not tempt them to contract forward, as there is evidently a very general belief that prices have not yet by any means got to their lowest point. The better qualities of round coal remain, for the most part, fairly steady at recent quotations; averaging 16s. to 17s. per ton for best Wigan Arley, 14s. 6d. to 15s. for Pemberton four-feet and seconds Arley, and 13s. to 14s. for common house coal, at the pit. Common round coals, which, owing to the depression in the iron trade and other industries, are becoming more difficult to move, are steadily receding from the nominal list rates; 11s. to 11s. 6d. being readily taken for ordinary steam and forge coals at the pit, while Staffordshire and Yorkshire coals are to be bought at much below Lancashire prices. A still more complete break-up has taken place in engine fuel prices; and for commoner sorts, which are quite a drug, it is scarcely possible to get at any really fixed basis, owing to a very large surplus output being forced on the market for prompt clearance, with the result that buyers in many cases are almost able to fix practically their own price. Shipping business continues slow, with low prices ruling at the ports; ordinary Lancashire steam coal scarcely averaging more than 12s. 6d. to 13s. per ton delivered at the Garston Docks or the High Level, Liverpool. Coke is weak, with prices easing down. Common Yorkshire furnace cokes are to be bought readily at about 10s. to 10s. 6d. per ton; Lancashire washed furnace cokes at about 13s. 6d. to 14s.; and good foundry cokes, which have been reduced 1s. to 1s. 6d. per ton, at about 25s. to 26s. at the ovens.

Northern Coal Trade.—Trade has shown a little more activity, as far as steam coals are concerned; but the milder weather and lengthening days are lessening the demand for some other classes of fuel, and this will affect prices, until fuller exports with the spring may cause a better state of the trade generally. In the steam coal trade, the price is steady at from 11s. 9d. to 12s. per ton f.o.b., according to the time of delivery; and steam smalls similarly vary from 5s. 9d. to 6s. In the gas coal trade, there have been of late one or two contracts made for export; and some others seem to be pending. Prices are varied to some extent by the rate of freight that may have to be paid; but perhaps the general quotation of freights would leave the cost of the coal at from 9s. to about 9s. 6d. per ton f.o.b., though for one or two classes of best Durham gas coals higher rates have had to be paid. The prices for occasional cargoes of gas coals may be quoted as from 9s. to 9s. 6d. per ton f.o.b.; and there seems to be a plentiful supply. In the coke trade the tone of the market is duller; and best Durham coke for export is from 17s. to 17s. 6d. per ton f.o.b. Blast-furnace coke is 13s. 6d. per ton at the Tees-side blast furnaces. Gas coke is quiet, with a very variable price; but perhaps 13s. per ton f.o.b. may be a medium quotation.

Scotch Coal Trade.—Trade does not improve; the inquiries for export being still exceedingly few. Prices continue to go down. There was a talk of the miners in Fifeshire declining to adopt the five days a week policy, which would have led to a lock-out; but at a meeting of their Executive Board on Saturday last, it was agreed to fall in with the proposal. The prices quoted are: Main 9s. to 9s. 3d. per ton f.o.b. Glasgow, ell 10s. to 10s. 6d., and splint 10s. 9d. to 11s. The shipments for the week amounted to 140,720 tons—a decrease of 8625 tons upon the previous week, and of 58,605 tons upon the corresponding week of last year. For the year to date, the shipments have been 1,364,810 tons—a decrease of 419,910 tons upon the same period of last year.

Divination for Water.—A successful demonstration of the water-finder's power has just taken place at the village of Oulton, between Lowestoft and Yarmouth. After digging a well 300 feet deep without finding water, the owners of the estate called in two "diviners." It is stated in a local paper that not only did they indicate where the water was to be found, but did it independently of each other; the second to traverse the ground making his discoveries after the marks made by the first had been carefully concealed.

Newport (I.W.) Town Council and the Gas Company's Bill.—The Newport Town Council, acting upon the report of a Sub-Committee who have consulted Mr. Littler, K.C., have decided to offer strenuous opposition to the Bill of the Gas Company. Among other clauses, the one relating to the supervision of pipes and fittings is specially objected to; as is also that relating to the raising of additional capital, the granting of which by Parliament would, it is urged, make it practically impossible for the Corporation to take over the works.

London County Council and Shareholders in Joint-Stock Companies.—The following notice of motion stands on the *agenda* of the London County Council in the name of Mr. R. Spokes: "That it be referred to the Local Government Committee to report (*a*) whether any means at present exist of ascertaining the names and addresses, and nature and extent of interest, of debenture stock and share holders in the companies supplying gas, electricity, water, or hydraulic power, or undertaking tramway or telephone service, or owning docks or wharves within the County of London; and, if not, (*b*) as to the desirability of the Council seeking parliamentary powers to bring all such companies, whether incorporated by Private Act of Parliament or otherwise, under similar obligations in that respect as would be the case had they been incorporated under the Companies' Acts, 1852 to 1900."

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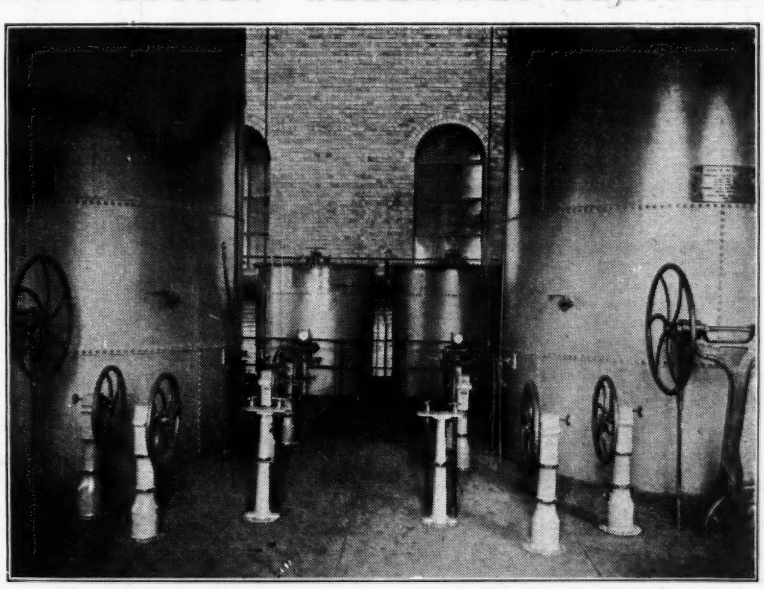

RESULTS PROVE EFFICIENCY.

Working Floor of Generator House. One Quarter Section of Birmingham Plant, Windsor Street Station.
The Maximum Daily Capacity of the Birmingham Corporation's Plant, which was erected by this Company, is 10 MILLION CUBIC FEET.

The Metric System.—The following notice has recently been issued in the works of Messrs. Mather and Platt, Limited, of Manchester: "From March 1, 1901, in all plans for the works, or to be sent to customers, dimensions must be given in English measure and also in the equivalent metric measure. Measurements on new lithographed plans are to be similarly given in both measures. All plans to go out to countries in which the metric system is in general use must be dimensioned in metric measure only. Screw-threads are to be indicated as heretofore according to the Whitworth standard. Technical information for countries using the metric system must be expressed in the centimetre-gramme-second; for example, pressure in kilogrammes per square centimetre, volumes in cubic metres. Calculations for dynamos made as heretofore in the test-room on the metric system are to be continued in the drawing-office on the same system. New scales obtained for the works are to be divided according to both English and metric measure."

Malmesbury Water-Works Arbitration.—Sir John Whittaker Ellis sat at the Malmesbury Town Hall last Thursday, in his capacity as Umpire in the matter of the proposed purchase by the Malmesbury Corporation of the undertaking of the Malmesbury Water-Works Company; the Arbitrators—Mr. J. W. Restler, Engineer of the Southwark and Vauxhall Water Company, for the Corporation, and Mr. J. H. Fielder, of Malmesbury, for the Company—having failed to agree. The Umpire first inspected the works, and then heard at length the arguments of the Arbitrators. Mr. Fielder estimated the sum to which the Company were entitled at £11,073, in which he included goodwill and prospective value. Mr. Restler, however, in giving the value as £3743 10s., argued that the Company should not be allowed anything for either one or the other. In his opinion, they were merely entitled to the present value of the works, to which he had added £859, representing the profit on three years' working. The Umpire intimated that he would take legal advice before giving his decision

Monte Video Water-Works Company, Limited.—The report for the past year states that the gross revenue amounted to £81,095; being an increase of £1459. The working expenses increased by £236; the net revenue being £52,705, against £51,481 for 1899. After paying interest and other charges, and providing £2745 for damages resulting from floods, and £2000 for depreciation on old meters, there remains an available balance of £29,359. An interim dividend of 2½ per cent. was paid on the 1st of November, and the Directors recommend a further dividend of 2½ per cent. (making 5 per cent. for the year, free of tax), carrying forward £9359. In March last, owing to unprecedented floods in the River Santa Lucia, the greater part of the Company's pumping-station was submerged, and serious loss sustained through damage to the filter-beds, buildings, and stores. All repairs and renewals were made as speedily as possible; and the service of water to the city was only interrupted for a few days. The cost of making good the damage amounted to £2745, which has been charged to the profit and loss account. The Company's relations with the Government have been satisfactory; the Executive having paid the accounts regularly.

Leakage of Gas at Richmond (Yorks.).—A long report was presented at the meeting of the Richmond (Yorks.) Town Council last Thursday by Mr. John Wright, the Gas Manager, giving the result of a general inspection of the gas-mains throughout the town. The investigation showed leakages estimated in the aggregate at 2,224,340 cubic feet per annum. The cause was attributed largely to defective mains and services. The leading mains had been laid thirty years. Mr. Wright recommended that all the old and small mains and services should be replaced by larger ones. The matter is to receive further consideration.

A Challenge.—Speaking at the meeting of the Barnsley Town Council last Tuesday, the Chairman of the Electric Lighting Committee (Mr. Brady) complained of a statement made by the Chairman of the Gas Company at the recent meeting. The offending words were: "The electric light is a soft, convenient, but expensive light, and anyone who is prepared to pay double the price of gas is quite justified in taking it." Mr. Brady contended that there was little difference in the cost; and he invited the Chairman of the Gas Company to provide a 16-candle power gas light to be placed aside a 16-candle power electric light, so as to ascertain the respective costs. This, he said, was clear and definite; and his Committee were prepared to take their stand on such a test.

Torquay Water Supply.—At the meeting of the Torquay Town Council last week, the Water Committee presented their estimate of receipts and expenditure for the ensuing year. The income is estimated at £14,710, as compared with £15,543 in the year just ending. Owing to the borough extension, and the reduction of the water-rate, St. Mary Church will now contribute £1200 instead of £1475, and Cockington £1000 instead of £1250. There is a loss of £525. Torquay is estimated to pay £7600, or £100 more than last year, and Newton Abbot £2750, or £150 increase. But income from "services" is to fall to £300; and £268 less is expected from the watershed revenue. For the first time for several years, the water income is estimated to be less than the expenditure, and the water account joins the other accounts with a deficit. The expenditure is put down at £15,145, of which no less than £8839 is for interest and redemption of loans.

Cowlyd Joint Water Board's Financial Position.—At the last meeting of the Board held at Conway, the Mayor of Conway (the Chairman) presiding, Mr. J. W. Raynes complained of the want of supply from which he had suffered for days together. In the course of a few months he had, in connection with the Llysfaen Stone Quarries, paid £440 for water which he never had; and his neighbour had paid no less than £520 under similar circumstances. The Chairman said the Cowlyd Board carried water to the boundary appointed. If Mr. Raynes wanted water he must convey it from the boundary. The Clerk (Mr. T. E. Parry) estimated that the balance against the Board at the close of the financial year would be £2912, against £4090 at the beginning. With regard to the loan account, he said the year opened with an adverse balance of £27,904, which had been reduced to £4389; while the Treasurer's balance against the Board amounted to £8139.

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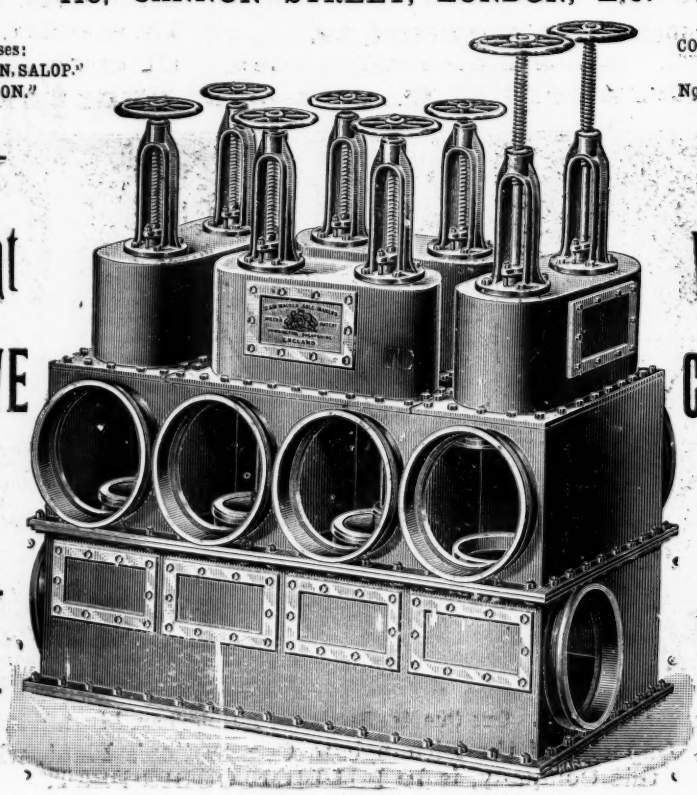

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PERFECTLY TIGHT UNDER EVERY EXTREME OF HEAT OR COLD.

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The Substitution of Gas for Electricity at Woking.—The protest of the ratepayers of the Station Ward, Woking, against the proposed substitution of gas for electricity for the public lighting, referred to last week (p. 709), came before the District Council on Wednesday; and Mr. Lushington announced, in view of it, and of the fact that the Electric Light Company had submitted a separate tender for the Station Ward, that he intended at the next meeting to move the rescission of the resolution accepting the Gas Company's tender. After some discussion on an amendment proposed by him, that the draft contract should not be forwarded to the Company, it was put and lost. The terms of the contract were subsequently considered by the members in detail.

Quality of the Exeter Water Supply.—A question having been raised with regard to the purity of the Exeter water supply, Mr. H. A. Willey, as Chairman of the Exeter Chamber of Commerce, submitted a sample for analysis and examination to Mr. Percy A. E. Richards, F.I.C., F.C.S., Public Analyst for St. Martin's-in-the-Fields, London, and also to Dr. Eyre, of the Bacteriological Laboratory. He felt that reports from authorities entirely independent of the city might be of especial value. Their reports are of a most reassuring character, and the citizens will be indebted to Mr. Willey for the trouble he has taken, and the good results. Mr. Richards reported that the water was "quite bright and clear, and yielded no deposit on standing." The results obtained by chemical analysis were eminently satisfactory, and afforded no grounds for suspecting the purity of the water, or its suitability for drinking purposes. Dr. Eyre, in the course of his report on the bacteriological examination of the water, said it showed it to be of a high grade of purity, giving no evidence of sewage contamination, and, therefore, in the absence of poisonous metals, a "sound potable water."

"Many Happy Returns of the Day" to Mr. Sellers.—Mr. Charles Sellers, the Engineer and Secretary of the York United Gas Company, has again reversed the usual birthday custom. Instead of looking out for congratulatory presents from friends, his practice has of late years been to give presents; and to the Gas Company's employees he has made little gifts of money. But he told the workmen last Friday, according to a paragraph in the "Yorkshire Herald," that he should on the present occasion vary the gifts, and instead of giving money to the men, he should give a pound of tea to each of their wives or their mothers, or to whoever acted as their housekeepers, so that if any of the men wished to drink his health they could join their wives and drink it in a cup of tea—adding that he regarded the custom that it was necessary to drink healths with wine or beer as a piece of superstition which ought to be levelled to the intelligence of the times. He said he felt sure the men would agree with him that the virtue of health drinking was not in the liquor, but in the sincerity of the wish. The cordial relations which have so long subsisted between Mr. Sellers and the workmen are so well known to our readers, that it is scarcely necessary to say that his remarks were received by them with hearty goodwill; and they wished him many happy returns of the day—a wish in which we join with all sincerity.

Sanction to borrow £1400 has been applied for in order to carry out certain water supply works for Towcester. The usual inquiry by an Inspector of the Local Government Board was held last Thursday. There was no opposition.

Mr. E. G. Okell, Assistant Electrical Engineer to the Plymouth Corporation, has been promoted to the position of Electrical Engineer, in place of Mr. J. H. Rider, who has obtained an appointment under the London County Council. Mr. Okell is to have charge of the street lighting, whether by electricity or gas.

The Directors of Messrs. A. & J. Stewart and Menzies have decided to recommend that (subject to audit) the following dividends be paid for the half year ended the 31st of December last—viz., at the rate of 6 per cent. per annum on the preference shares, and 11 per cent. per annum on the ordinary shares, placing £30,000 to reserve fund, £35,000 to depreciation fund, and carrying forward £28,089.

The Municipality of Grosswardein, Nagy Várád, Austro-Hungary, will on the 30th inst. consider tenders for the concession of public and private lighting in the town. Offers may be made for lighting by (1) electricity, (2) coal gas, or (3) acetylene. The concession would date from Jan. 1, 1904, and the town would guarantee the use of 1220 lamps, with an average of 2000 hours' lighting annually. Plans and all particulars can be had on application to the Rathhaus.

The use of petroleum fuel is making considerable progress in Roumania. Several boats on the Danube have, it is reported, been using it for some time past with very satisfactory results, it being much cheaper than coal. At Galatz, to take an example, the price of coal is 46 lei (£1 16s. 6d.) per ton; while an equivalent quantity of refined petroleum costs 35 lei (£1 8s.), and residues which can also be burned, 22 lei (17s. 6d.). On the other hand, the heating power of 3½ tons of petroleum is equal to 5 tons of coal.

In a series of articles, entitled "Glimpses of the Past," in the "Leeds Mercury," reference is made to the lighting of Halifax by coal gas. This was done for the first time on Feb. 15, 1823, "to the great satisfaction of the inhabitants." The writer quotes: "Mr. Grafton has been the Engineer for the erection of these works; and it is said that by the use of clay composition for the retorts the gas is produced in greater quantities, as well as at a less expense, than when the retorts are made of iron, and that the light is rendered more pure and brilliant."

Much interest was created last Tuesday in Sheffield, says the "Daily Express," by the announcement that the firm of Messrs. W. Jessop and Sons intend for the future to manufacture certain qualities of steel in the United States to supply their customers in that country. The principal reason given for this step is the heavy duties of from £10 to £13 a ton which are charged on steel imported into the United States. These charges cause British steel to be so dear in America as to put it out of reach, except to a comparatively small number of users. The Directors have also been influenced in their decision by the cheapness of fuel in America, and the prospect of the maintenance of high prices by the home coalowners.

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Prize Medal
Gas-Cooker.

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Prices, £2 10s. to £13 10s.

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LONDON, GLASGOW, MANCHESTER,
BIRMINGHAM, & BRISTOL.

The Wrexham Gas Company have placed an order with Messrs. Biggs, Wall, and Co. for two of their "Rapid" charging-machines.

The Town Clerk reported to the Burslem Town Council last week that he had received from the Local Government Board sanction to borrow £31,000 for gas-works purposes.

The Corporation of Torquay have increased the salary of Mr. Ingham, the Water-Works Engineer, by £75 per annum; and that of Mr. Storey, the Electrical Engineer, by £100 per annum.

The District Council of the rising seaside resort of Heacham, in Norfolk, have instructed Mr. E. J. Silcock, M.Inst.C.E., of Leeds, to prepare a scheme of water supply; and it is understood that the drainage question will also be shortly dealt with.

Messrs. R. & A. Main are holding an exhibition at Bedminster, at which Miss L. A. Fry is giving practical cookery demonstrations. At Brightlingsea, Messrs. Richmond and Co., Limited, have been holding an exhibition, with Mrs. Charles Marshall as cookery demonstrator.

Messrs. Ashmore, Benson, Pease, and Co., Limited, have obtained the contract for the erection of new purifiers at the Middlesbrough Gas-Works, in a house to be put up by Mr. J. G. Porteous. The tender of the first-named firm was for £6930; that of Mr. Porteous, for £2054—together, £8984.

The Walsall Corporation have placed the order with Messrs. R. Dempster and Sons, Limited, of Elland, for eight purifiers 48 ft. by 18 ft. by 6 ft., on Green's system. They are connected so as to form four pairs. The contract comprises pan conveyors to take the spent oxide direct from the discharging ports, placed under the purifiers, to the overhead revivifying floor, and push-plate conveyors for returning it to the purifiers. The whole of the work will be carried out in accordance with plans and specifications prepared by Mr. B. W. Smith, the Gas Engineer to the Corporation.

In the report of the Directors of Messrs. C. & W. Walker, Limited, for the year ending Jan. 31 last, it is stated that the net profits come to £14,320, to which must be added the amount brought forward—viz., £1591—making a total of £15,911. Deducting the interim dividend of £1100 paid to the preference shareholders, there remains an available sum of £14,811. Out of this the Directors propose to pay a dividend at the rate of 5½ per cent. on the preference shares for the six months ending Jan. 31, £1100; a dividend of 10 per cent., free of income-tax, on the ordinary shares, £4000; a bonus of 2s. 6d. per share, also free of income-tax, on the ordinary shares, £1000; to place £5000 to the reserve fund (making it £10,000); and to carry forward £3711. The works are well employed in all departments; and the prospects for the current year are satisfactory.

NOTICES TO CORRESPONDENTS, ADVERTISERS, AND SUBSCRIBERS.

No notice can be taken of anonymous communications. Whatever is intended for insertion must be authenticated by the name and address of the writer; not necessarily for publication, but as a proof of good faith.

COPY FOR ADVERTISEMENTS for the "JOURNAL" should be received at the Office NOT LATER than TWELVE O'CLOCK NOON ON MONDAY, to ensure insertion in the following day's issue.

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[For Illustrated Advertisement, see March 5, p. 647.]

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FOR SALE.

THE Corporation of Longton have for DISPOSAL:—

Two CORNISH BOILERS, by Danks of Dudley, each 17 ft. long by 5 ft. diameter; Size of Tube, 2 ft. 6 in.

The Boilers are in good condition, and are fitted with best Gun-Metal Mounts and Gauges. They have been working at a pressure of 60 lbs. per square inch.

Also New FIRE-CLAY RETORTS—
38 lengths 16 in. Round Retorts, 6 ft. 8 in. long, Mouthpiece Ends.
16 lengths 16 in. Round Retorts, 6 ft. 8 in. long, Middle Pieces.
15 lengths 16 in. Round Retorts, 10 ft. long, Mouthpieces.
7 lengths 22 in. by 16 in. Oval Retorts, 6 ft. 8 in. long, Mouthpieces.
4 lengths 22 in. by 16 in. Oval Retorts, 6 ft. 8 in. long, Middle Pieces.

Cast-Iron MOUTHPIECES, ASCENSION and DIP PIPES, for four through Beds of Sevens. Wrought-Iron HYDRAULIC MAINS for five through Beds of Sevens.

Applications to view, and Offers for same, may be arranged by applying to

W. LANGFORD,
Engineer and Manager.

Gas-Works,
Longton, Staffs.

FOR SALE, Cheap—One, Two, or Three PURIFIERS, 8 ft. square by 4 ft. deep, in good condition, with Valves, Connections, and Lifting Gear.

INQUIRIES for all kinds of SECOND-HAND GAS PLANT will also be esteemed by SAML. WHILE AND SON, 60, Queen Victoria Street, LONDON, E.C.

BARNSLEY CORPORATION WATER-WORKS.

TO PIPE-LAYING CONTRACTORS.

THE Corporation of Barnsley are prepared to receive TENDERS for the laying of about 2 miles of CAST-IRON SOCKET PIPES, 20 inches diameter.

The Drawings may be inspected; and Specifications and Forms of Tender may be had on payment of the sum of Two Guineas (to be returned on receipt of a *bonâ-fide* Tender), on application at the Office of Messrs. T. & C. Hawksley, Civil Engineers, 30, Great George Street, Westminster, S.W., or at the Office of Mr. J. Henry Taylor, Borough Surveyor, Barnsley, on and after Wednesday, the 13th inst.; and Tenders must be delivered at my Office on or before Tuesday, the 2nd day of April, 1901.

The Corporation do not pledge themselves to accept the lowest or other Tender.

HENRY HORSFIELD,
Town Clerk.

Barnsley, March 7, 1901.

EDINBURGH AND LEITH CORPORATIONS GAS COMMISSIONERS.

STORES.

THE Commissioners invite Tenders for the supplying of—

LIME.	FIRE-CLAY BRICKS and RETORTS.
OILS AND PAINTS.	YARN, &c.
TIMBER.	IRON, STEEL, and IMPLEMENTS.
METERS.	IRON CASTINGS.
GAS-FITTERS' STORES.	CAUSEWAY REPAIRS, &c., &c.
WROUGHT-IRON TUBES & FITTINGS.	CARTAGES.
CAST-IRON PIPES & CONNECTIONS.	

Required for their various Undertakings during the Year from Whitsunday first.

The Contractors must guarantee that, in the execution of their Contracts, they will pay the Standard Rate of Wages, or such Wages as are generally recognized as fair in their Business.

Tender Forms and all Information can be had on application to the Chief Engineer and Manager, at the Gas-Works, New Street.

Offers must be lodged not later than Ten o'clock on Monday forenoon, the 25th curt., in sealed envelopes, addressed to the undersigned, and marked "Tender for Lime," or as the case may be.

The Commissioners are not to be bound to accept the lowest or any Tender.

JAMES MCG. JACK,
Clerk.

25, Waterloo Place,
Edinburgh, March 11, 1901.

EDINBURGH AND LEITH CORPORATIONS GAS COMMISSIONERS.

GAS ENRICHING.

THE Commissioners are prepared to receive TENDERS for the supply of 3000 Tons of OIL suitable for Gas-Making Purposes.

The Oil to be delivered in Railway Tank-Waggons at the New Street Works, North British Railway, over a period of Six or Twelve Months in approximate equal monthly quantities; the Commissioners reserving to themselves the right to accept half the quantity for Six Months only, or the whole quantity over a period of Twelve Months.

The Contractors must guarantee that, in the execution of their Contracts, they will pay the Standard Rate of Wages, or such Wages as are generally recognized as fair in their Business.

Further Particulars may be obtained on application to the Chief Engineer and Manager, Mr. W. R. Herring.

Tenders to be lodged by Ten o'clock on Monday forenoon, the 25th curt., in sealed envelopes, marked "Tender for Gas Oil," and addressed to the undersigned.

The Commissioners are not to be bound to accept the lowest or any Offer.

JAMES MCG. JACK,
Clerk.

25, Waterloo Place,
Edinburgh, March 11, 1901.

EDINBURGH AND LEITH CORPORATIONS GAS COMMISSIONERS.

GAS COAL AND CANNEL.

THE Commissioners are prepared to receive TENDERS for the supply of about 180,000 Tons of GAS COAL and CANNEL for delivery at the Edinburgh, Leith, Portobello, and Granton Works, over a period, in the option of the Commissioners, of Six Months or Twelve Months—the Quantity required during the first Six Months being 70,000 Tons.

The Deliveries are to commence immediately after the acceptance of the Contract.

The Contractors must guarantee that, in the execution of their Contracts, they will pay the Standard Rate of Wages, or such Wages as are generally recognized as fair in their Business.

Further Particulars, Schedule, and Form of Tender can be obtained on application to the Chief Engineer, Mr. W. R. Herring, at the Gas-Works, New Street.

Tenders to be lodged by Ten o'clock on Monday forenoon, the 25th inst., in sealed envelopes, marked "Tender for Coal," and addressed to the undersigned.

The Commissioners are not to be bound to accept the lowest or any Offer.

JAMES MCG. JACK,
Clerk.

25, Waterloo Place,
Edinburgh, March 11, 1901.

WANTAGE URBAN DISTRICT COUNCIL.

THE Gas Committee of the above Council invite TENDERS for the purchase of the surplus TAR to be produced at their Gas-Works during the Year ending March 31, 1902.

For Particulars, apply to the Manager, Gas-Works, to whom Tenders must be sent not later than March 31.

GORDON WALKER,
Engineer and Manager.

THE Ballymena and Harryville Gas-light Company, Limited, invite TENDERS for 2500 Tons of best screened GAS COAL, free on Waggons at Larne Harbour, to be delivered before the 1st of November next.

Payment to be made on the first Thursday in March, 1902.

Tenders to be sent to Mr. Samuel Hood, Mill Street, Ballymena, on or before the 30th of March, 1901.

BARNSTAPLE GAS COMPANY.

THE Directors of the above Company invite TENDERS for the surplus TAR produce at their Works during the Twelve Months ending the 31st of March, 1902.

The Tar will be delivered into Tanks (to be provided by Purchaser) at Barnstaple Station.

Tenders to be sent to the undersigned not later than the 28th inst.

The Directors do not bind themselves to accept the highest or any Tender.

F. L. SCHOFIELD,
Secretary and Manager.

Gas Office, Barnstaple,
March 12, 1901.

TENDERS FOR TAR.

THE Directors of the Exeter Gaslight and Coke Company invite TENDERS for their surplus TAR for Twelve Months from the 25th of March next, at per Ton delivered into Contractor's Tanks at the Company's Works.

Sealed Tenders, endorsed "Tenders for Tar," will be received by the undersigned on or before Saturday, the 23rd inst.; but the Directors do not bind themselves to accept the highest or any Tender.

By order,
W. A. PADFIELD,
Engineer and Secretary.

Gas Offices, Exeter,
March 5, 1901.

MONTROSE GASLIGHT COMPANY.

THE Directors invite Tenders for the supply during the Year, from the 1st of May, 1901, of 3000 Tons of GAS COAL, viz.:—

1000 Tons of First-Class CANNEL COAL,
1500 Tons of Second-Class CANNEL COAL,
500 Tons of GAS SPLINT COALS or NUTS,

all free on rail on the Gas Company's Siding, Montrose.

Sealed Tenders, marked "Tenders for Coal," and giving Name, Analysis, and Quantity of Coal offered, to be lodged with the Subscriber not later than the 26th of March, 1901.

THOMAS D. HALL,
Manager.

Gas-Works, Montrose,
March 11, 1901.

BOROUGH OF COLNE.

(GAS DEPARTMENT.)

THE Gas Committee invite Tenders for the surplus TAR made at their Works during the Twelve Months ending March 31, 1902.

Particulars may be obtained on application to the undersigned.

Sealed Tenders, endorsed "Tar," must be addressed to the Chairman of the Gas Committee, Gas-Works, Knott's Lane, Colne, Lancs., and delivered not later than Saturday, the 23rd day of March, 1901.

The highest or any Tender not necessarily accepted.

FRED THORPE,
Engineer and Manager.

Gas-Works, Colne, Lancs.,
March 7, 1901.

EAST RETFORD CORPORATION GAS-WORKS.

GASHOLDER TANK.

THE Gas Committee are prepared to receive TENDERS for the Work and Materials required in the Excavating and Building of a BRICK and PUDDLE GASHOLDER TANK, 87 feet diameter, and 20 feet deep.

The Specifications and Drawings may be seen on application to the undersigned on payment of Two Guineas, which will be returned on receipt of a *bonâ-fide* Tender.

Sealed Tenders, endorsed "Contract No. 1 Tank," to be addressed to the Chairman of the Gas Committee, Retford, not later than the 30th day of March, 1901.

The Committee do not bind themselves to accept the lowest or any Tender.

J. B. FENWICK,
Gas and Water Engineer.

Retford, March 12, 1901.

EAST RETFORD CORPORATION GAS-WORKS.

GASHOLDER.

THE Gas Committee are prepared to receive TENDERS for the Work and Materials required in the Construction and Erection of a TELESCOPIC GASHOLDER, with Outer Lift 85 feet diameter, and 20 feet deep.

The Specification and Drawings may be seen on application to the undersigned on payment of Two Guineas, which will be returned on receipt of a *bonâ-fide* Tender.

Sealed Tenders, endorsed "Contract No. 2 Gasholder," to be addressed to the Chairman of the Gas Committee, Retford, not later than March 30, 1901.

The Committee do not bind themselves to accept the lowest or any Tender.

J. B. FENWICK,
Gas and Water Engineer.

Retford, March 12, 1901.

BOROUGH OF LEIGH.
(GAS AND WATER DEPARTMENTS.)

THE Gas Committee of the above Corporation invite TENDERS for the supply of FIRE-CLAY, RETORTS, and BRICKS.

Forms of Tender and further Particulars may be obtained on application to the Manager, Mr. John Foster, Gas-Works, Leigh.

Sealed Tenders, endorsed "Tender for Retorts, &c.," to be sent to the undersigned on or before Twelve o'clock noon, on Saturday, March 23, 1901.

By order,
(Signed) PEREGRINE THOMAS,
Town Clerk.

Town Hall, Leigh, Lancs.,
March 6, 1901.

COMMERCIAL GAS COMPANY.

NOTICE is Hereby Given, that an ORDINARY MEETING of the Commercial Gas Company will be holden at the Cannon Street Hotel, in the City of London, on Thursday, the 4th of April, 1901, at Twelve o'clock at noon—

To receive the Directors' Report and the Accounts of the Company for the Half Year ended the 31st of December, 1900.

To declare a Dividend.

To elect Directors and an Auditor in the place of those retiring.

To elect an Auditor in the place of a deceased Auditor.

The STOCK TRANSFER BOOKS WILL BE CLOSED from the 22nd of March inst. to the 4th of April next, both days inclusive.

By order of the Board,
H. D. ELLIS,
Secretary.

Offices: Stepney,
March 13, 1901.

AMENDED NOTICE.

EAST LONDON WATER-WORKS COMPANY.

NOTICE is Hereby Given, that the HALF-YEARLY GENERAL ASSEMBLY of the Proprietors will be held at the Company's Offices, St. Helen's Place, Bishopsgate Street, E.C., on Thursday, the 4th of April, 1901, at Twelve o'clock noon precisely, pursuant to Act of Parliament.

The TRANSFER BOOKS in respect of the ORDINARY STOCK WILL BE CLOSED from the 21st of March inst. to the 10th of April inclusive, and RE-OPENED on the 11th of April, on which day the Dividends on this Stock will be payable.

Notice is also Hereby Given, that immediately after the termination of the Ordinary General Assembly, an EXTRAORDINARY GENERAL ASSEMBLY of the Proprietors of the Company will be held for the purpose of considering and determining as to the creation and issue of DEBENTURE STOCK, authorized to be raised under the Provisions of the East London Water Act of 1900.

By order,
I. A. CROOKENDEN,
Secretary.

St. Helen's Place,
Bishopsgate Street, E.C., March 18, 1901.

SALES BY AUCTION OF GAS AND WATER STOCKS AND SHARES.

MR. ALFRED RICHARDS begs to notify that his AUCTIONS of STOCKS and SHARES in London, Suburban, and Provincial Gas and Water Companies are held PERIODICALLY, at the Mart, Tokenhouse Yard, E.C.

He also undertakes the issuing by AUCTION of GAS and WATER STOCKS and SHARES under Parliamentary Powers.

Terms for issuing such Capital, and also for including Gas and Water Stocks and Shares in these periodical Sales, can be obtained on application at Mr. ALFRED RICHARDS' OFFICES, 18, FINSBURY CIRCUS, E.C.

By order of the Directors of the
CHIGWELL, LOUGHTON, AND WOODFORD GAS COMPANY.

400 £10 SHARES.

MR. ALFRED RICHARDS will Sell the ABOVE BY AUCTION, at the Mart, E.C., on Tuesday, March 26, at Two o'clock, in Lots.

Particulars of the AUCTIONEER, 18, FINSBURY CIRCUS, E.C.

Net Price: Cloth Bound, 12s. 6d.; Morocco Gilt, 18s.

GAS COMPANIES' BOOK-KEEPING.

A Practical Treatise on the Keeping of Gas Companies' Accounts.

BY

JOHN HENRY BREARLEY & BENJAMIN TAYLOR,
OF LONGWOOD.

This Book has been very favourably reviewed in the Press; the following being examples of the notices:—

The explanatory remarks are given in language that annot be misunderstood.—*Leeds Mercury.*

We can confidently recommend this work to Accountants' students, and to practitioners desiring a reliable work on the system of book-keeping, most suitable for the accounts of Gas Companies.—*Accountants' ournal.*

The subject is comprehensibly dealt with.—*Morning Post.*

LONDON:
WALTER KING, 11, Bolt Court, FLEET STREET, E.C.

STAINES RESERVOIRS JOINT COMMITTEE.
INCORPORATED BY ACT OF PARLIAMENT, 59 AND 60 VICT., CAP. 241.

ISSUE OF £200,000 £3 PER CENT. DEBENTURE STOCK.

Payment of Interest guaranteed by the three following Companies:—

WEST MIDDLESEX WATER-WORKS COMPANY,
GRAND JUNCTION WATER-WORKS COMPANY,
AND THE
NEW RIVER COMPANY, jointly and severally.

NOTICE is Hereby Given, that the Joint Committee are prepared to receive TENDERS for the above amount, being a further portion of the DEBENTURE STOCK created by the above Act, and by the Act of 1898, bearing Interest at £3 per cent. per annum, payable half yearly, and redeemable at par after the expiration of 25 Years from the date of issue, subject to Six Months' Notice being given by the Committee.

The Staines Reservoirs Act, 1898, authorizes Trustees to invest Trust Funds in this Stock.

Tenders must be delivered at the Office of the Committee, No. 19, Marylebone Road, N.W., not later than Two o'clock p.m., on Wednesday, the 20th of March next.

Particulars and Conditions, together with Form of Tender, may be obtained at the said Office, or will be forwarded on application; also of Messrs. Hollams, Sons, Coward, and Hawksley, Solicitors, 30, Mincing Lane, E.C.; and of Messrs. Prescott, Dimsdale, and Co., Limited, Bankers, 50, Cornhill, E.C.

By Order of the Joint Committee.
F. H. WYBROO,
Secretary.

Office of the Committee:
19, Marylebone Road, London, N.W.,
Feb. 20, 1901.

THOMAS DUXBURY & CO.,
16, DEANSGATE, MANCHESTER.

Best Gas Coal and Cannel, giving High Illuminating Power, Large Yield per ton, and reasonable in Price.

Telegrams "DARWINIAN, MANCHESTER."
Telephone 1806.

TO GAS AND GENERAL ENGINEERS.

Easy Payment System. Particulars on Application.

COKE-BREAKERS,
PRICES REDUCED.
(THOMAS & SOMERVILLE'S PATENT)
With Elevators and Conveyors worked by Steam or Gas Engine.

GEORGE WALLER & CO.,
165, QUEEN VICTORIA STREET, E.C.;
and at STROUD, GLOUCESTERSHIRE

CRESSWELLS' ASBESTOS CO., LTD.
WELLINGTON MILLS
BRADFORD, YORKS.

Asbestos Spinners and Manufacturers.
Telephone No. 950. Tels.: "ASBESTOS, BRADFORD."

If you want **FIREPROOF ASBESTOS BOARDS** or **SHEETS** for Screens or Lining Woodwork, don't mind troubling us for Prices and Samples. Ask for No. 2 Catalogue.

GAS-FIRE FUEL.
Applications for Colonial and Foreign Agencies desired.

HEATHCOTE GAS COAL.
Rich in Illuminating Power and Yield of Gas.
Above the Average in Weight and Quality of Coke.
Maintains a High Standard in Residuals.

THE GRASSMOOR CO., LD.,
CHESTERFIELD.

TROTTER, HAINES, & CORBETT, LIMITED,
Brettell's Estate
FIRE-CLAY & BRICK WORKS,
STOURBRIDGE.

Manufacturers of GAS-RETORTS, GLASSHOUSE FURNACE & BLAST-FURNACE BRICKS, LUMPS, TILES, and every description of FIRE-BRICKS.
Special Lumps, Tiles, and Bricks for Regenerative and Furnace Work.
SHIPMENTS PROMPTLY AND CAREFULLY EXECUTED.

LONDON OFFICE: R. CULL, 84, OLD BROAD STREET, E.C.

HEBBURN MAIN GAS COALS.

Yield of Gas per Ton . .	10,500 Cubic Feet.
Illuminating Power . . .	16·4 Candles.
Coke	68 per Cent.

For Prices, f.o.b. Ship or Delivered by Rail, apply to

The Wallsend & Hebburn Coal Company, Ltd.
B Lombard Street,
NEWCASTLE-ON-TYNE.
W. RICHARDSON, Fitter.

ALL PARTS FOR
GAS-METERS,
INDICES, CRANKS, WORMS, &c.

PREPAYMENT ATTACHMENTS.

Supplied by the
Tourtel Manufacturing Co., Ltd.,
146A, QUEEN VICTORIA STREET, E.C.

HYDRAULIC BLOWER
For blowing Air into Gas Purifiers for the purpose of
REVIVIFYING THE FOULED OXIDE.

Full Particulars on application.

LUXWERKE LUDWIGSHAFEN AM RHEIN.

HARDMAN & HOLDEN, LD.
ESTABLISHED 1820.
SULPHURIC ACID.

GUARANTEED absolutely free from Arsenic and of excellent Purity. Specially prepared for Sulphate of Ammonia Manufacturers.

Works: BLACKBURN; Miles Platting and Clayton, MANCHESTER.

Head Office: Miles Platting, MANCHESTER.
Inquiries Solicited.

JAMES OAKES & CO.
ALFRETON IRON-WORKS, DERBYSHIRE
AND
Wenlock Iron Wharf, 21 & 22, Wharf Road, CITY ROAD, LONDON, N.,

Manufacture and keep in Stock at their Works (also large stock in London)

PIPES and CONNECTIONS, 1½ to 48 inches in diameter, and make and erect to order RETORTS, PURIFIERS and TANKS, with or without planed joints, COLUMNS, GIRDERS, SPECIAL CASTINGS, &c., required by Gas, Water, Railway, Telegraph, Chemical, Colliery, and other Companies.

NOTE.—Makers of HORSLEY'S PATENT SYPHONS. These are cast in one piece, without Chaplets; doing away with Bolts, Nuts and Covers, and rendering Leakage impossible.

5 PER CENT. PREFERENCE SHARE ISSUE.

THE NORTH WARWICKSHIRE WATER COMPANY.

Incorporated under the North Warwickshire Water Acts, 1898 and 1900.

Particulars of Sale by Tender of

5 per cent. PREFERENCE SHARES of £10 each,

Being the balance of the Preference Share Capital, the creation of which was authorized by the North Warwickshire Water Act, 1900.

AUTHORIZED SHARE CAPITAL:		
Under North Warwickshire Water Act, 1898 . . .	£36,000	£84,000
Under North Warwickshire Water Act, 1900 . . .	£48,000	
SHARE CAPITAL issued to date—ORDINARY (fully paid)		£37,080
PREFERENCE (5 per cent.)		4,510
		£41,590

MINIMUM PRICE, £10 PER SHARE.

£1 per Share, or 10 per cent. of the purchase money to accompany Tender; £3 per Share, or 30 per cent., to be paid on each of the following dates—viz., the 12th day of April, the 12th day of May, and the 12th day of June, 1901.

Company's Bankers: LLOYDS BANK, LIMITED, COVENTRY.

The Directors of the North Warwickshire Water Company hereby give notice that, under the provisions of their Acts, and in accordance with the Resolutions passed at a General Meeting of Proprietors, they are prepared to receive, at or before Four o'clock in the afternoon of the 22nd March, 1901, Tenders for the purchase of 1949 5 per cent. **Preference Shares of £10 each, of and in the undertaking, being the unissued portion of the authorized Preference Share Capital.**

The present issue is made for the purpose of the construction of further works and the extension of the Company's mains to the new areas sanctioned by the Act of 1900 (which are urgently in want of a proper water supply) and for other purposes.

The Directors invite attention to the **sound character of the investment offered by the 5 per cent. Preference Shares,** *ranking as they do before £60,000 Ordinary Share Capital, of which £37,080 is paid up and £22,920 reserved for future issue. The present Debenture debt is only £9000 at 4 per cent. Interest* The permanent plant and main pumping-station at Corley, near Coventry, are now completed, and in full working order, and, the machinery being of most modern type, the expenses of working will be on an exceedingly economical scale.

The Company's area, as extended by the Act of 1900, contains a population of about 45,000, and has a rateable value of about £250,000, both of which are steadily increasing. The districts of supply are in proximity to the Towns of Leamington and Rugby, and on the west adjoin the area supplied by the Corporation of Birmingham. The Company have laid over 25 miles of mains, and are now supplying water to 1200 customers in parts of the City of Coventry, and in Foleshill, Sowe, Keresley, and Corley. Further applications are being received and additional services put on as rapidly as possible. The limit of the 1898 Act authorized the supply of Foleshill and Stoke (partly now annexed to the City of Coventry), Exhall, Sowe, Wyken, Binley, Keresley, and Corley. *By Section 4 of the Company's 1900 Act, the limits of supply are largely extended as follows:—*

> "Meriden Allesley Berkswell Hampton-in-Arden Barston Knowle Balsall "Packwood Coundon Stoneleigh Baginton Ryton-on-Dunsmore Brandon and "Bretford Wolston Stretton-on-Dunsmore Thurlaston Dunchurch Bourton-on-"Dunsmore Frankton Princethorpe Bubbenhall Weston-under-Weatherley "Wappenbury Eathorpe Marton Birdingbury Leamington Hastings Cubbington Hunningham Offchurch Long Itchington Stockton Napton-on-the-Hill "Southam Ufton Harbury and Bulkington all in the County of Warwick."

The important works in the Company's area include silk, woollen, hosiery, and elastic factories, iron foundries and stamping works, cycle factories, breweries, steam and other laundries, extensive lime works and brick and tile manufactories. In the north and east of the district are coal mines.

By Sections 7 and 37 of the Company's Acts of 1898 and 1900 respectively, powers are given to local authorities to purchase portions of the Company's undertaking on conditions favourable to the Shareholders.

As an illustration of the value as investments of **Preference Shares in other Water-Works Companies,** the following may be mentioned:—

Wrexham Water-Works Company 4½ p.c. Pref. per £100 Stock, £137 10s. Premium **37½** p.c.

Banbury Water Company 4½ p.c. Pref. Shares, £10 each, £13. Premium **30** p.c.

Newcastle and Gateshead Water Company 5 p.c. Pref. Shares, £100 each, £157. Premium **57** p.c.

Southwark and Vauxhall Water Company 5 p.c. Pref. Shares, £100 each, £160. Premium **60** p.c.

Chelsea Water Company 5 p.c. Pref. Shares, £100 each, £160. Premium **60** p.c.

Consett Water-Works Company 4 p.c. Pref. Shares, £5 Shares, £6¾. Premium **27½** p.c.

South Staffordshire Water 5 p.c. Pref. Shares, £100 Stock, £163. Premium **63** p.c.

Tenders, which must be on the Form annexed, will be received at the Company's Bankers, **not later than Four o'clock in the afternoon on Friday, the 22nd March, 1901,** and notices of acceptance will be given as provided in Condition 5. Where the Tender is not accepted, the deposit will be returned in full, and in case of a partial acceptance the balance of the deposit will be applied towards the subsequent instalments. Copies of Particulars, Conditions of Sale, and Forms of Tender may be obtained at Messrs. Lloyds Bank, Limited, at Coventry; their London Office, Lombard Street, E.C., and Branches; or at the Company's Offices, where copies of the Company's Acts can be inspected.

By Order of the Board of Directors.

L. H. DEROUET, *Secretary.*

Directors.

RICHARD BARNES, Director of the Wetherby District Water Company, (*Chairman*).

SIDNEY R. DENNIS, Chairman of the Cranbrook District Water Company.

F. MILLER, Director of the Wetherby District Water Company.

E. R. PAINTER, Chairman of the Cobham Gaslight and Coke Company, Limited.

E. T. GOULD, Director of the Cranbrook District Water Company.

Company's Bankers.	**Offices.**
LLOYDS BANK, COVENTRY.	2, WARWICK ROW, COVENTRY.

Works and Pumping Station.

CORLEY, NEAR COVENTRY.

12th March, 1901.

FORM OF TENDER.

TO THE DIRECTORS,

THE NORTH WARWICKSHIRE WATER COMPANY.

I, the undersigned, hereby tender for .....**5 per cent. Preference Shares, of £10 each** of the North Warwickshire Water Company, at the price of £.....:.....:..... per Share, and I enclose herewith a cheque for £.....:.....:....., being the amount of the required deposit of £10 per cent.; and I agree to accept the Shares hereby tendered for, or any less number that you may allot, and to pay the balance of the purchase money according to the Particulars and Conditions of Sale, dated the 12th day of March, 1901.

Christian and Surname in full.....

Address.....

Occupation (or if Mrs. or Miss).....

Usual Signature.....

Date.....1901.

This Form to be sent to the Company's Bankers, LLOYDS BANK, LIMITED, Coventry, on or before Four o'clock on 22nd March, 1901.

Cheques are to be made payable to the Order of "LLOYDS BANK, LIMITED," and crossed.

BOLDON GAS COALS.

Yield of Gas per Ton.	10,500	Cubic Feet.
Illuminating Power . .	16·9	Candles.
Coke	66·7	Coke.
Sulphur	0·86	Sulphur.
Ash	2·04	Ash.

As per Analysis by
Mr. JOHN PATTINSON, F.I.C., F.C.S.

For Prices, &c., apply to
W. H. PARKINSON,
THE HARTON COAL CO., LTD.,
NEWCASTLE-ON-TYNE.

Telegraphic Address: "PARKINSON, NEWCASTLE."

THE SILICA FIRE-BRICK COMPANY,

OUGHTIBRIDGE, near SHEFFIELD,
MANUFACTURE
SILICA BLOCKS, BRICKS, AND CEMENT
OF SUPERIOR QUALITY
FOR GAS-FURNACES.

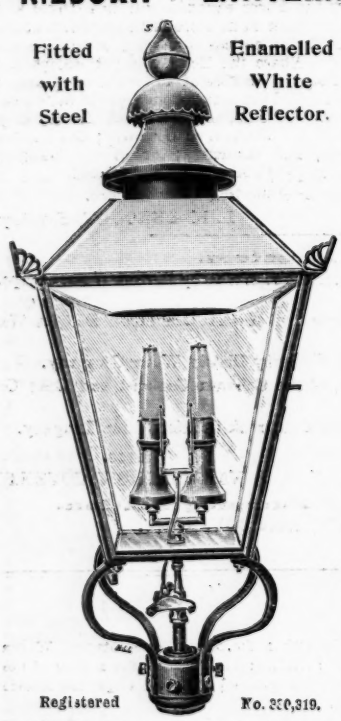
Trade Mark: "SILICA."

These Goods (largely used in Gas, Glass, Iron, and Steel Works) are, on account of their
GREATER DURABILITY,
Strongly recommended where EXCESSIVE HEATS have to be maintained.

THE
"KILBURN" LANTERN.

Fitted with Steel

Enamelled White Reflector.



Registered No. 200,319.

The "Kilburn" Lantern (for double lights) and the "St. Albans" Lantern have been adopted for lighting the Town of St. Helens.

H. GREENE & SONS, LTD.
19, FARRINGDON ROAD, E.C.
Telephone: 1215 HOLBORN. Telegrams: "LUMINOSITY."

NITRATE of Thorium and Cerium.
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Illuminating Power	16 1/10 Stand. Sperm Candl.
Coke (of good & pure quality)	13¾ Cwt. per Ton.
Sulphur	A little over 1 per Cent.
Ash	Under 1 per Cent.
Tar	163 lbs. (Avoir.) per Ton.
Ammoniacal Liquor	103 lbs. (Avoir.) per Ton.

HOLMSIDE GAS COALS are supplied to the largest Gas Companies in England and on the European Continent; London alone consuming about half the produce.

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Analysis made by
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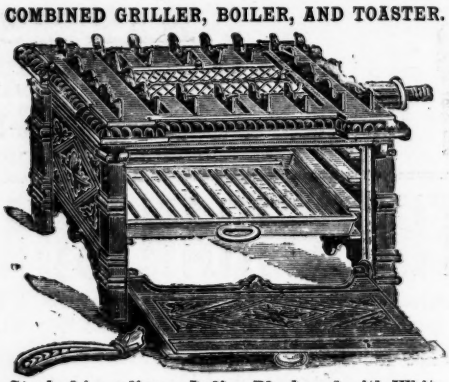

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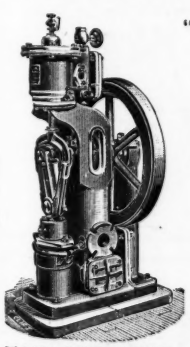

Fig. 705. "SINGLE RAM" STEAM-PUMP.

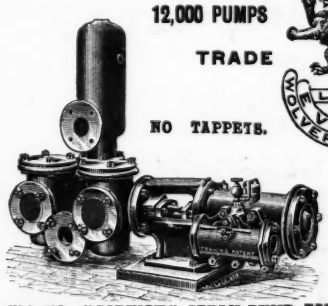

Fig. 598. "CORNISH" STEAM-PUMP FOR BOILER FEEDING, &c.

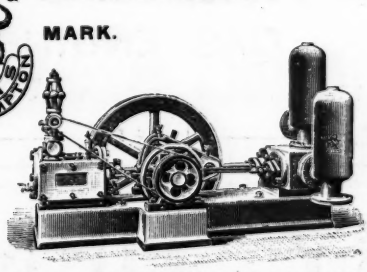

Fig. 688. "RELIABLE" STEAM-PUMP FOR TAR AND THICK FLUIDS.

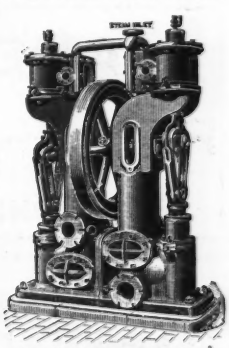

Fig. 712. "DOUBLE-RAM" STEAM-PUMP.

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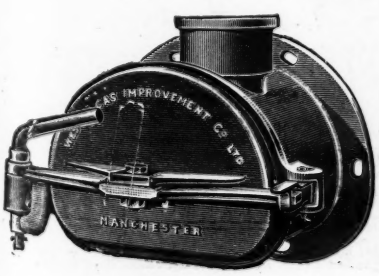

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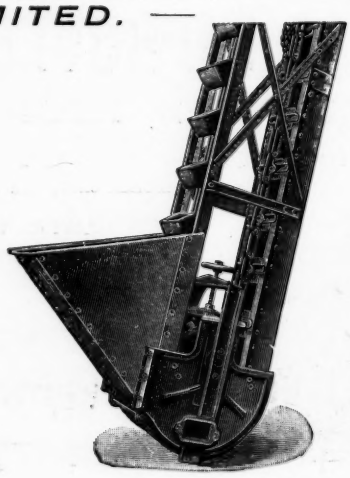

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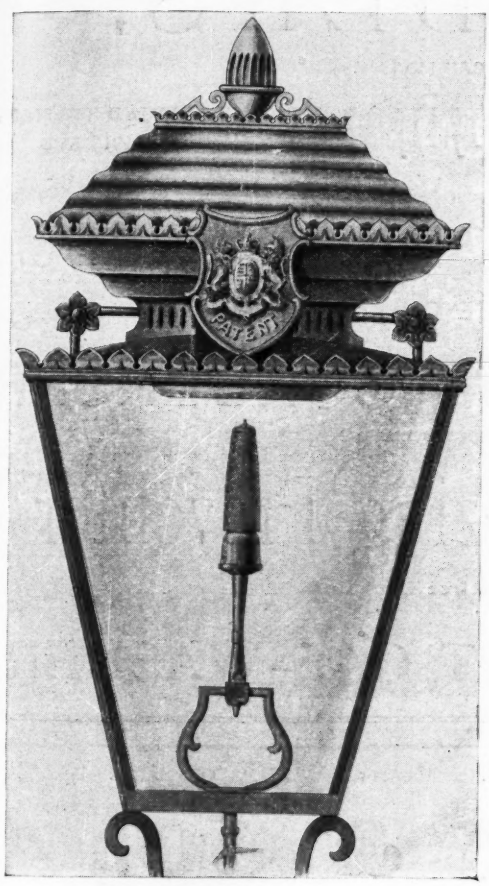

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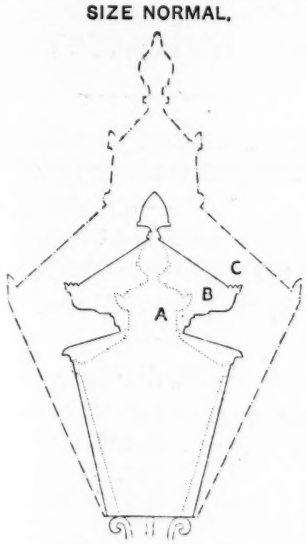

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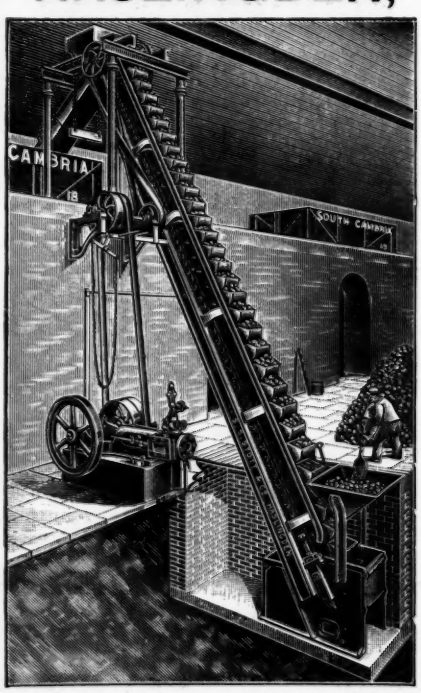

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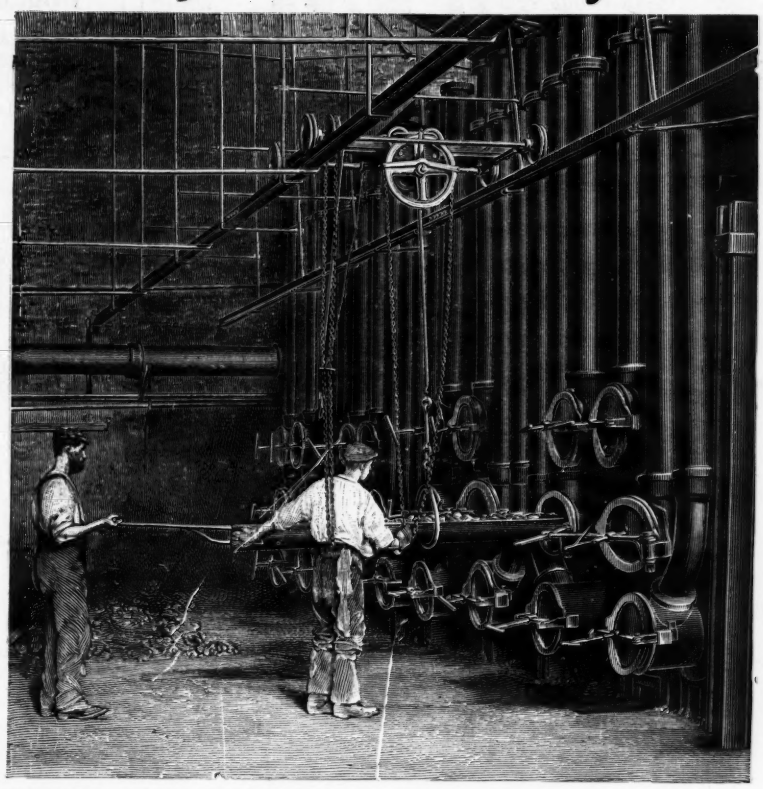

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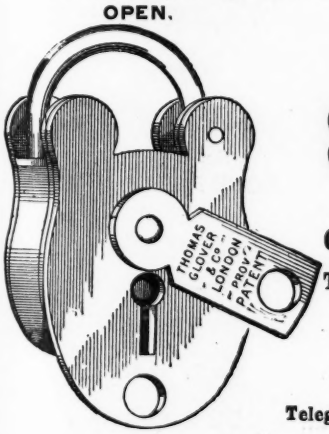

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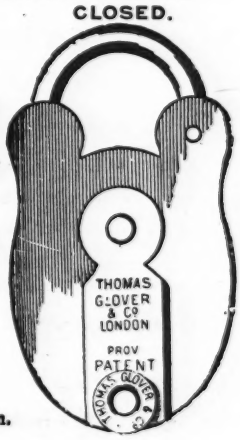

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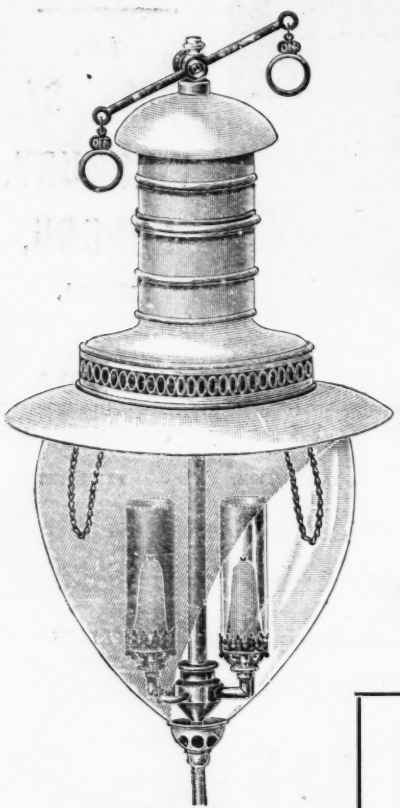

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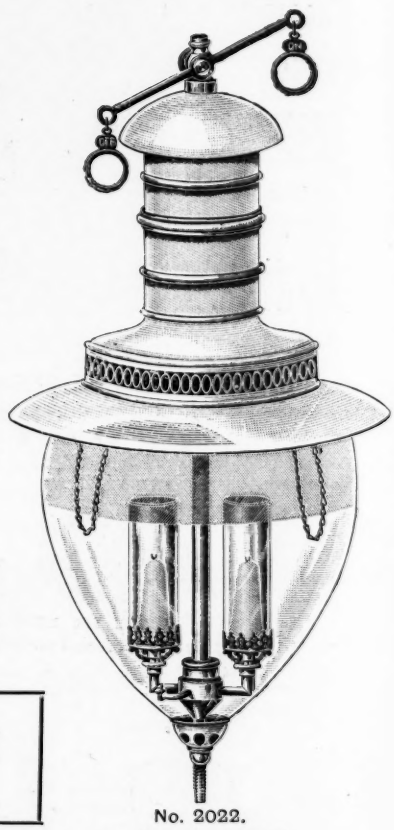

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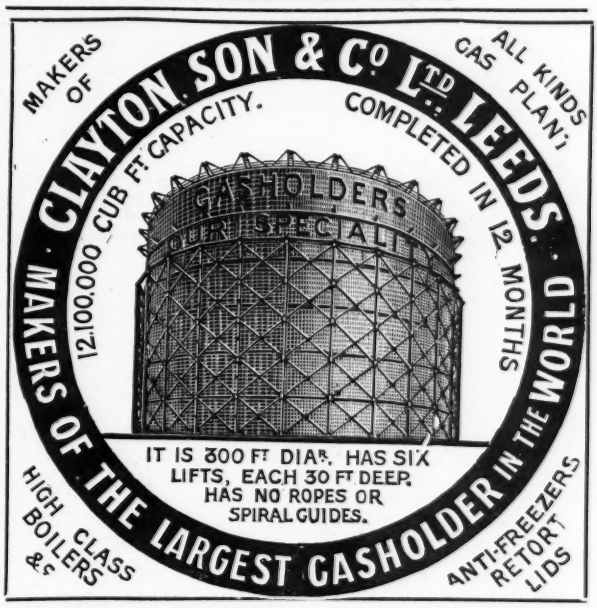
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